

ŠKODA

Workshop Manual OCTAVIA II 2004 ➤

2.0/125 kW TDI CR Engine

Engine ID	CEG A								
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Edition 06.08

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



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00 – Technical data

1 Technical data

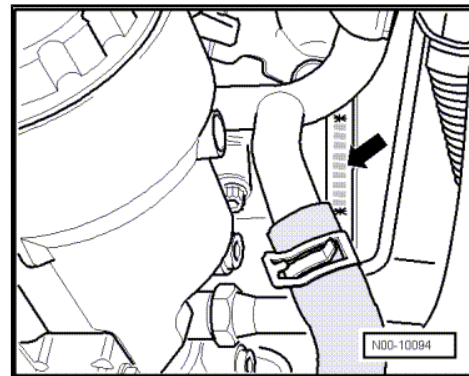
1.1 Engine number

The engine number ("engine identification character" and "serial number") are located at the joint separating the engine/gearbox -arrow-.

In addition, a sticker with the "engine identification character" and "serial number" is affixed to the toothed belt guard.

The engine code is also indicated on the vehicle data sticker.

- ◆ The engine identification characters have 4 digits starting with the letter "C".
- ◆ The first 3 digits of the engine identification characters refer to the displacement and the mechanical construction of the engine. They are type-punched in the cylinder block including the serial number.
- ◆ The 4th digit refers to the output and torque of the engine and depends upon the engine control unit.



1.2 Engine characteristics

Engine identification character		CEGA
Manufactured		06.08 ?
Exhaust limit values conforming to exhaust emission standard		EU5
Displacement	l	1,968
Power output	kW at rpm	125/4200
Torque	Nm at rpm	350/1750...2500
Bore	Ø mm	81,0
Stroke	mm	95,5
Number of cylinders / valves per cylinder		4 / 4
Compression ratio		16,5 : 1
Firing order		1-3-4-2
Catalytic converter		yes
Exhaust gas recirculation with radiator		yes
Turbocharging		yes
Charge air cooler		yes
Diesel particle filter		yes

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01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations and directions

1.1 Self-diagnosis

This repair group is no longer applicable.

For this use "Vehicle self-diagnosis", "Measuring method" and "Targeted fault finding" ⇒ Vehicle diagnosis, testing and information system VAS 5051.

1.2 Supplementary instructions and assembly work on vehicles with an air conditioning system



WARNING

Refrigerant circuit of the air conditioning system must not be opened.



Note

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit.

- Unscrew the holding clamp(s) on the refrigerent lines
- Remove V-ribbed belt ⇒ [page 31](#) .
- Remove AC compressor from the bracket for auxiliary units ⇒ [page 29](#) .
- Mount the air conditioning compressor and the condenser in such a way that the refrigerent lines/hoses are not under tension.

1.3 Safety precautions when working on the fuel supply system



WARNING

- ◆ *The fuel or the fuel lines in the fuel system can become very hot (risk of scalding)!*
- ◆ *The fuel system is under pressure!*
- ◆ *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact.*
- ◆ *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

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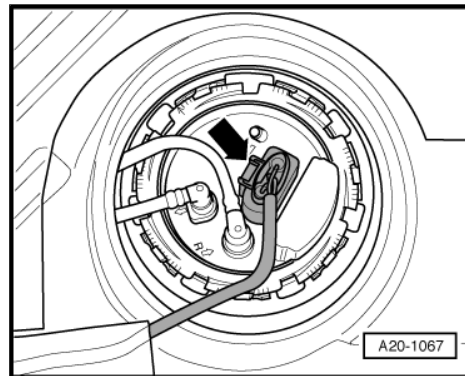
- ◆ The fuel pump is activated when the ignition is switched on and by the door contact switch of the driver door. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector -arrow- must be disconnected from the fuel delivery unit.



WARNING

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.
- ◆ Ensure that there is adequate free access to all moving or hot components.



Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following points must be observed:

- ◆ If component parts of the fuel system, starting with the fuel tank through to the fuel high pressure pump, are removed or replaced the basic setting "test of fuel pump for predelivery" must be carried out for the ventilation of the fuel system ⇒ Vehicle diagnosis, testing and information system VAS 5051.
- ◆ If a fuel pump, fuel line or the fuel filter is removed or replaced, the basic setting "test of fuel pump for predelivery" must be carried out "once" before the first engine start.
- ◆ If the fuel high pressure pump is removed, the basic setting "test of fuel pump for predelivery" must be carried out "3 times" before the first engine start.
- ◆ If the fuel high pressure pump is replaced, the initial fuel filling of the fuel high pressure pump must be carried out before the first engine start ⇒ **page 185**.

Pay attention to the following points when removing and installing the sender for fuel gauge display or the fuel pump (fuel delivery unit) on a fuel tank that is filled or partially filled:

- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Avoid skin contact with fuel! Wear fuel-resistant gloves!

1.4 Safety precautions when working on the diesel direct injection system



WARNING

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*
- ◆ *The fuel or the fuel lines in the fuel system can become very hot (risk of scalding)!*
- ◆ *The fuel system is under pressure!*
- ◆ *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact.*
- ◆ *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

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Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following points must be observed:

- ◆ *If component parts of the fuel system, starting with the fuel tank through to the fuel high pressure pump, are removed or replaced the basic setting "test of fuel pump for predelivery" must be carried out for the ventilation of the fuel system → Vehicle diagnosis, testing and information system VAS 5051.*
- ◆ *If a fuel pump, fuel line or the fuel filter is removed or replaced, the basic setting "test of fuel pump for predelivery" must be carried out "once" before the first engine start.*
- ◆ *If the fuel high pressure pump is removed, the basic setting "test of fuel pump for predelivery" must be carried out "3 times" before the first engine start.*
- ◆ *If the fuel high pressure pump is replaced, the initial fuel filling of the fuel high pressure pump must be carried out before the first engine start → [page 185](#).*

If test and measuring devices are required during test drives observe the following:

- ◆ Always secure the test and measuring devices on the rear seat and have a second person operate them there.

If the test and measuring devices are operated from the passenger seat, the passenger can be injured by the release of the passenger airbag in the event of an accident.

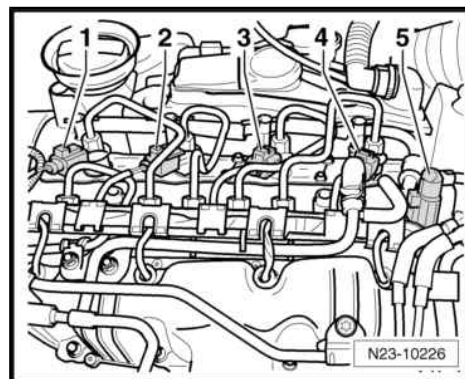


WARNING

Secure the diagnostic device to the rear seat and operate from that position.

Observe the following points to prevent injury to persons and/or damage to the injection and preheating system:

- ◆ Disconnect and connect wires of the preheating and injection system as well as measuring device wires when the ignition is switched off.
- ◆ If the engine must be operated at starter speed, without it starting, unplug the connector -5- at the fuel pressure regulating valve -N276- .
- ◆ Before disconnecting the battery determine the code of the radio fitted with anti-theft coding.
- ◆ Always switch off the ignition before disconnecting and re-connecting the battery. Otherwise the engine control unit may be damaged.
- ◆ After connecting the battery, carry out certain additional operations ⇒ Electrical System; Rep. Gr. 27 .



1.5 Regulations concerning cleanliness when working on the fuel supply/fuel injection system

Carefully observe the following “6 rules” for cleanliness when working on the fuel supply/injection system:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean parts: Remove spare parts from their wrapping immediately before installing. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.
- ◆ Also make sure no diesel fuel runs onto the coolant hoses. If this is the case clean the hoses immediately. Replace immediately any hoses which have suffered damage.

1.6 Regulations concerning cleanliness when working on the exhaust gas turbo-charger

Carefully observe the following “5 rules” for cleanliness when working on the exhaust gas turbocharger:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.

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- ◆ Only install clean parts: Remove spare parts from their wrapping immediately before installing. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.

1.7 General instructions for charge air system



WARNING

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.
- ◆ Ensure that there is adequate free access to all moving or hot components.



Caution

In case a mechanical damage to the exhaust turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, perform the following tasks:

- ◆ Clean all oil lines.
- ◆ Change the engine oil and replace the oil filter
- ◆ Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.
- ◆ Check all air guides and charge air cooler for foreign bodies.

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

- ◆ The charge-air system must be tight, check ⇒ [page 170](#) .
- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed. Only gaskets and sealing surfaces of the push-fit couplings are coated with oil ⇒ [page 169](#) .
- ◆ Observe assembly markings on the hoses and components.
- ◆ All hose connections of the charge air system are secured with spring strap clamps or push-fit couplings.
- ◆ Only install approved clamps for securing the hose connections ⇒ Electronic Catalogue of Original Parts .
- ◆ Use pliers for spring strap clamps to fit the spring strap clips.
- ◆ Assembly of hose connections with push-fit couplings ⇒ [page 169](#) .



- ◆ Before screwing on the oil feed line, fill the exhaust gas turbocharger on the connection fitting with engine oil.
- ◆ After installing the turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the turbocharger.



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10 – Removing and installing engine

1 Removing and installing engine

1.1 Removing engine

Special tools and workshop equipment required

- ◆ Removal tool for inner lining of the door panel - MP 8-602/1-
- ◆ Engine mount -T10012-
- ◆ Engine and gearbox jack , e.g. -V.A.G 1383 A-
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Double ladder , e. g. -VAS 5085-
- ◆ Pliers for spring strap clamps



Note

- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable straps that have been loosened or cut open when the engine was removed must be fitted again in the same location when the engine is installed again.*
- ◆ *Collect drained coolant in a clean container for proper disposal or reuse.*



Caution

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ ***Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.***
- ◆ ***In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.***

Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ➔ [page 2](#) .

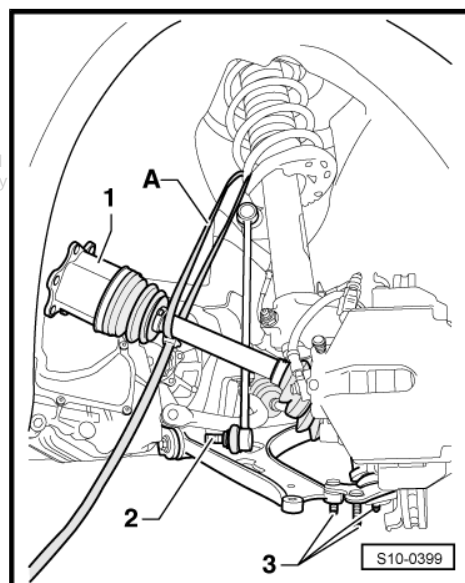
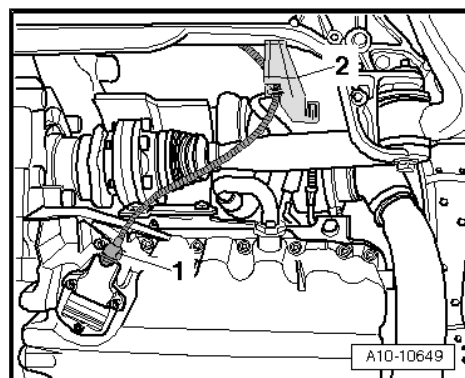
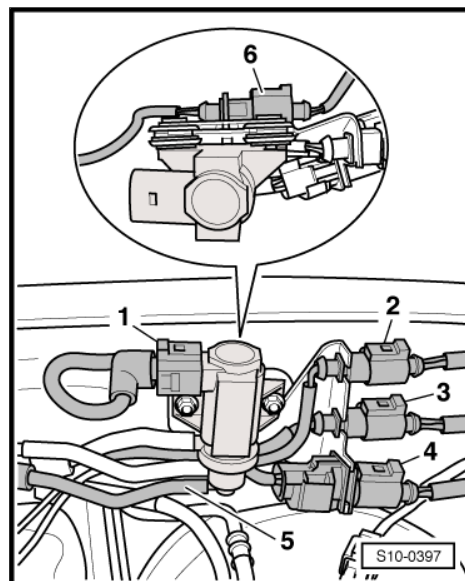
- If present, remove the adapter for the safety wheel bolts from the luggage compartment.
- Disconnect the battery-earth strap with the ignition off ➔ Electrical System; Rep. Gr. 27 .
- Remove engine cover ➔ [page 17](#) .
- Remove air filter housing with air mass meter -G70- and intake hose ➔ [page 196](#) .
- Remove battery ➔ Electrical System; Rep. Gr. 27 .

- Unplug the following plug connections at the bulkhead:
- 2 - Exhaust gas temperature sender 4 -G648-
- 3 - Exhaust gas temperature sender 1 -G235- (Temperature sender upstream turbocharger -G507 -)
- 4 - Lambda probe -G39-
- 6 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter -G527-)
- Pull off the vacuum hose -5- from the charge pressure control solenoid valve -N75 - .
- Remove pre-exhaust pipe with diesel particle filter
⇒ [page 203](#) .

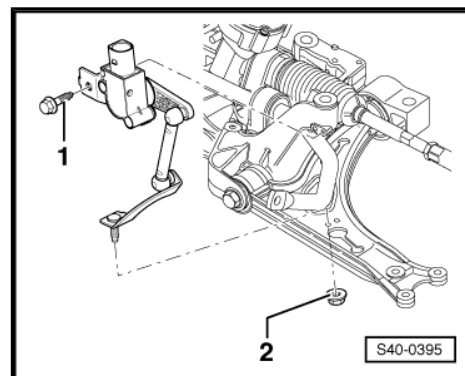
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- Disconnect plug -1- at the oil level and oil temperature sender -G266- .
- Remove bracket -2- for the wiring harness of the oil level and oil temperature sender -G266- from the assembly carrier.
- Unscrew left front wheel.
- Remove the right and left wheelhouse liner bottom part ⇒ Body Work; Rep. Gr. 66 .
- Unscrew the left drive shaft from the flange shaft of the gear-box.
- Unscrew the nut from the left coupling rod -2- of the anti-roll bar and press the coupling rod off the anti-roll bar.
- Unscrew the nuts from the left steering joint -3- and press the steering joint out of the suspension arm.

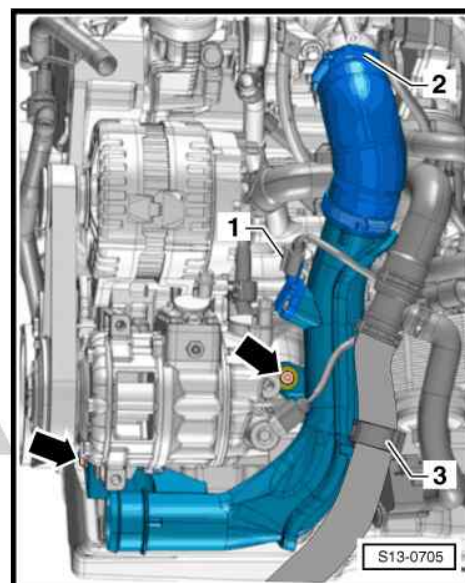
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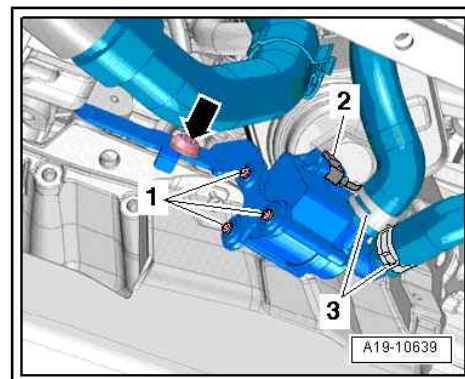
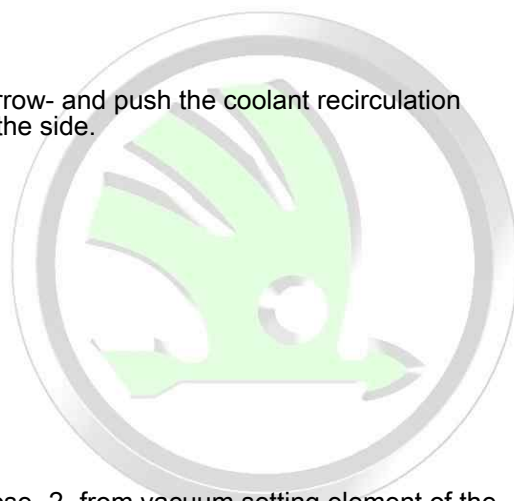
- Unscrew the nut -2- from the front left track control arm on installed vehicle level sensor -G78- .
- Turn steering to full left lock.
- Swivel the steering joint outwards and secure the drive shaft -1- with a band -A- in the wheelhouse as shown in the illustration.
- Insert the steering joint to ensure stabilisation with a threaded bore into the suspension arm.
- Remove radiator ⇒ [page 132](#) .



- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.

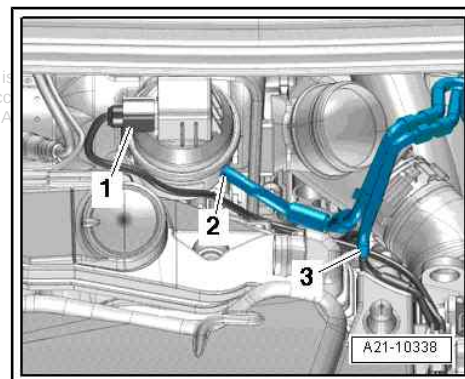


- Unscrew screw -arrow- and push the coolant recirculation pump 2 -V178- to the side.

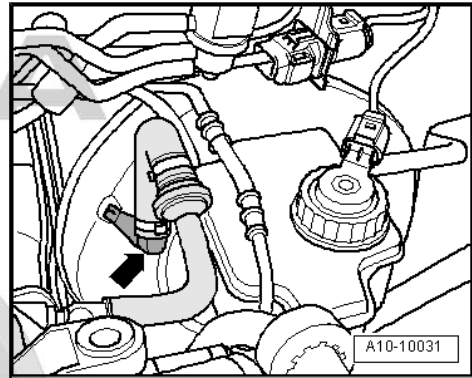


- Detach vacuum hose -2- from vacuum setting element of the exhaust turbocharger.

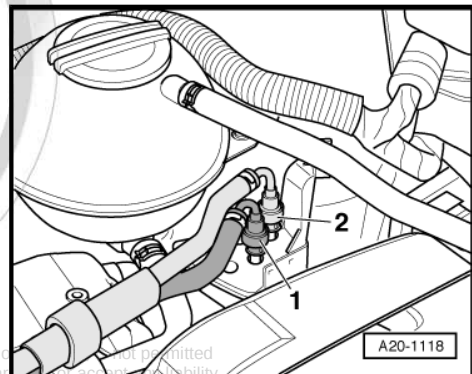
- Disconnect vacuum hose -3-.



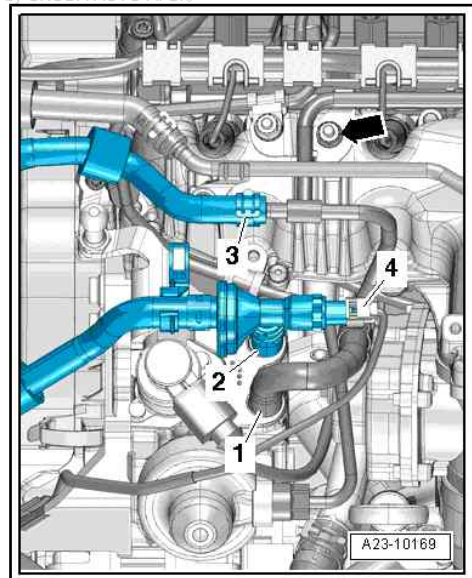
- Remove the vacuum hose -arrow- from the brake servo unit.



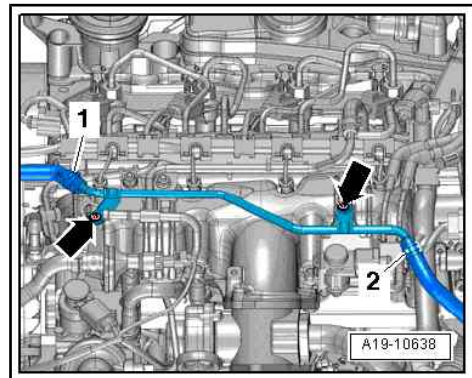
- Separate fuel feed line -2- and fuel return-flow line -1-, to do so press in securing ring.



- Disconnect plug -4- at fuel temperature sender -G81- .
- Remove fuel feed line and fuel return-flow line, to do so loosen hose clamps -2 and 3-.



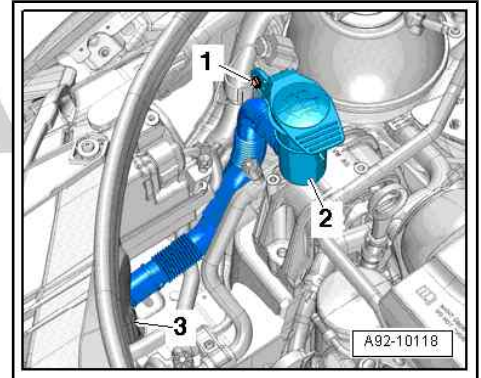
- Remove the coolant hose to the expansion reservoir, to do so slacken the hose clamp -1-.
- Detach the bottom coolant hose from the coolant expansion reservoir.



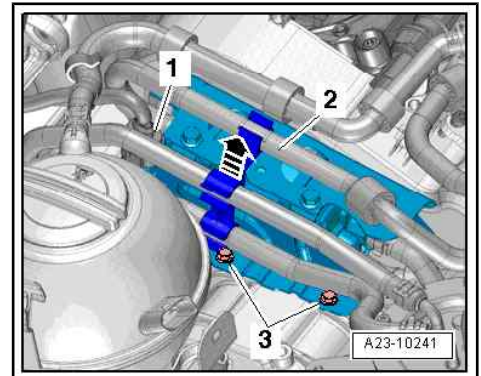
- Release screw -1-.
- Push the filler tube with the filler neck -2- for the washer-fluid reservoir to the side.

i Note

The fuel filter is not shown to simplify the illustration.



- Unhook fuel hose -2- from bracket.
- Remove the bracket for the fuel lines upwards -arrow- and place it to the side.
- Disconnect plug -1- at the additional fuel pump -V393- .
- Release screws -3- (20 Nm).

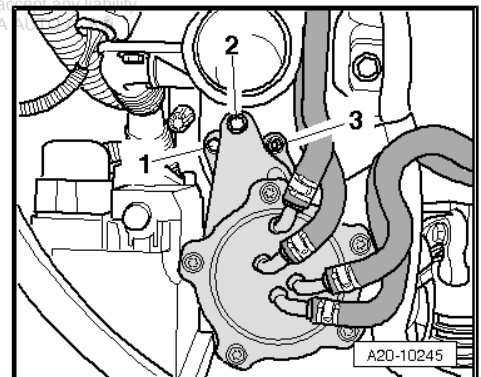


- Release screw -1- by two turns.
- Release screw -2- and nut -3-.
- Unclip bracket for coolant line at fuel filter.
- Remove the fuel filter with the hoses connected and the bracket together with the additional fuel pump -V393- .
- Remove V-ribbed belt ⇒ [page 31](#) .



WARNING

Refrigerant circuit of the air conditioning system must not be opened.

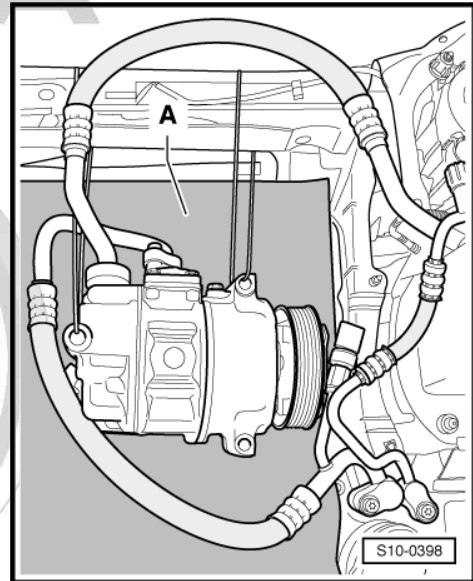


i Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

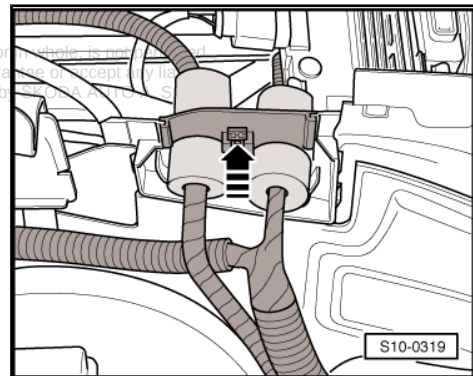


- Remove the AC compressor from the bracket for auxiliary units, to protect the charge air cooler place cardboard -A- underneath it and secure the AC compressor with connected refrigerant hoses to the lock carrier.
- Unlatch the fuse and disconnect the front plug from the engine control unit ➤ [page 198](#) .

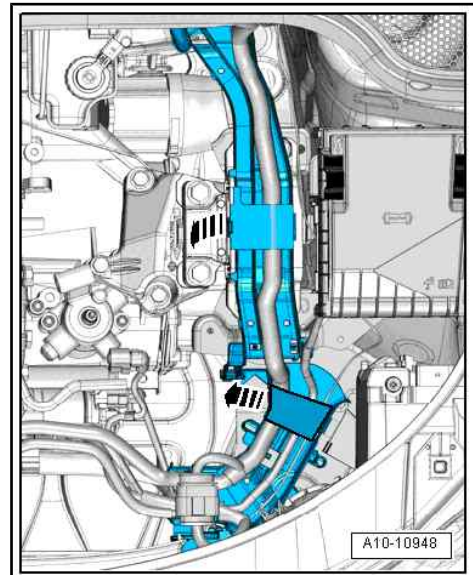


- Release duct for engine wiring harness -arrow- and pull out upwards.

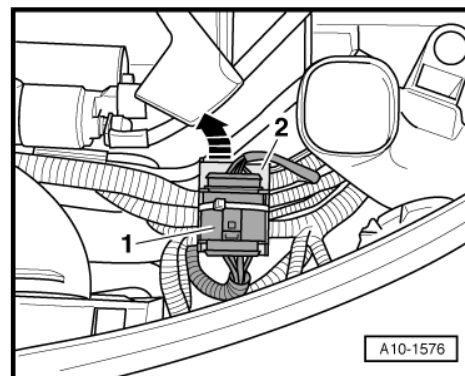
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- Open the cable guides -arrows-, remove the engine wiring harness and place down to the side.



- Expose plug connection -1- and disconnect.
- Open the bracket -2- lying below the cable guide.
- Remove the wiring loom of the engine control unit from the wiring using the removal tool for inner lining of the door panel -MP 8-602/1- and lay it on the engine.

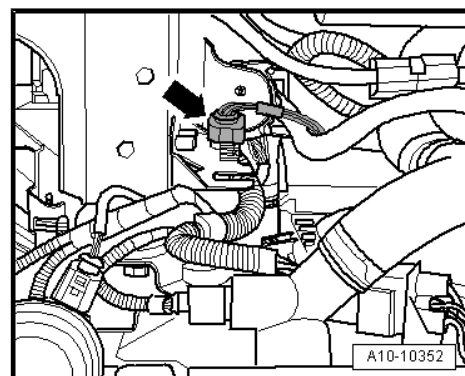


- Disconnect electrical plug connection -arrow- at the bottom left frame side rail.

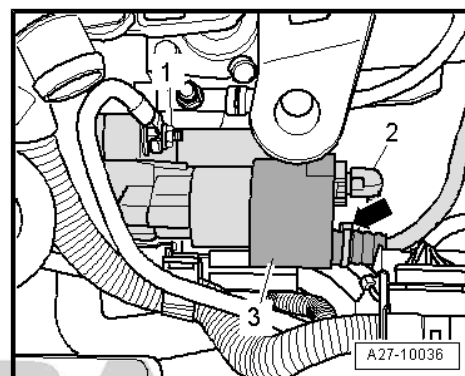


Note

For purposes of presentation, the fitting position is shown from below.



- Remove the cable strap for -arrow- protective collar if present.
- Unbolt the earth strap -1-.
- Unplug connector -2-.
- Pull back the protective collar and unscrew the B+ cable from the solenoid switch of the starter.
- Disconnect all further necessary plugs at the engine and gearbox or separate the lines to the engine and gearbox.



ŠKODA



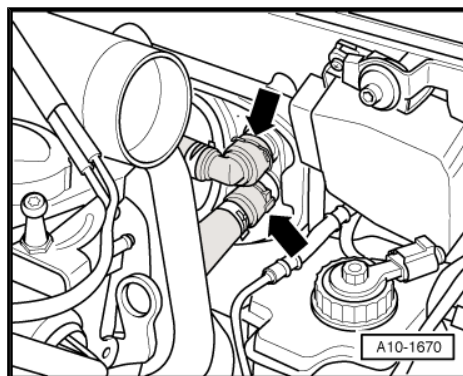
- Separate the quick couplings -arrows- at the heat exchanger.

Vehicles fitted with auxiliary heating

- Disconnect coolant hoses at auxiliary heating system.
- Remove exhaust pipe of auxiliary heating (only for vehicles with extended exhaust pipe) ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 82 .

Vehicles fitted with a manual gearbox

- Remove shift mechanism from gearbox ⇒ Gearbox; Rep. Gr. 34 .
- Remove pressure line from breather/slave cylinder ⇒ Gearbox; Rep. Gr. 30 .



WARNING

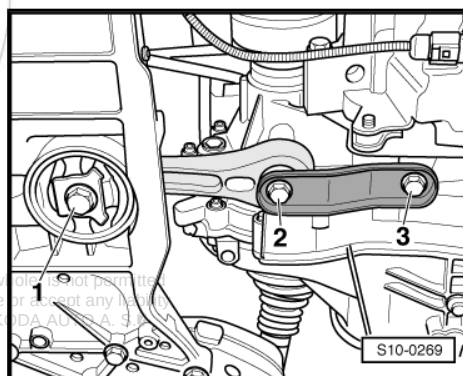
After separating the hydraulic line, do not operate the clutch pedal.

Vehicles with automatic gearbox

- Remove shift mechanism from gearbox ⇒ Automatic Gearbox DSG - 02E; Rep. Gr. 34 .

Continued for all vehicles

- Detach all connecting and vacuum hoses from the engine.
- Unscrew screw -1- and remove pendulum support.

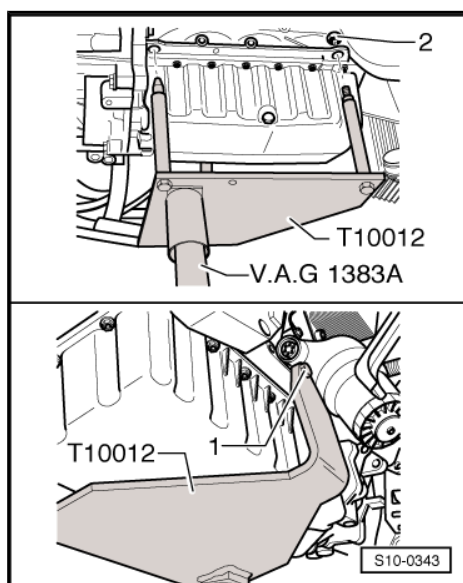


- Screw engine mount -T10012- to the cylinder block with nut -2- and screw -1- to 20 Nm.
- Insert engine/gearbox jack -V.A.G 1383 A- in the engine mount and slightly raise.

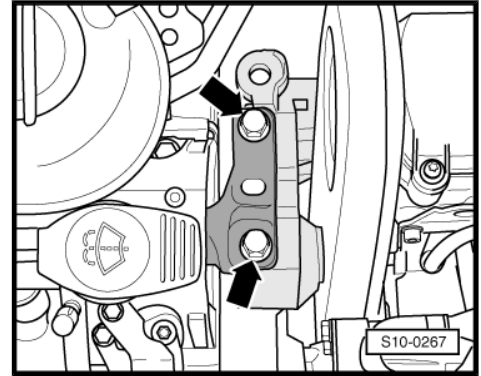


Note

Use double ladder to release the screws for the engine/gearbox mounting.



- Successively release screws for engine mounting -arrows-.

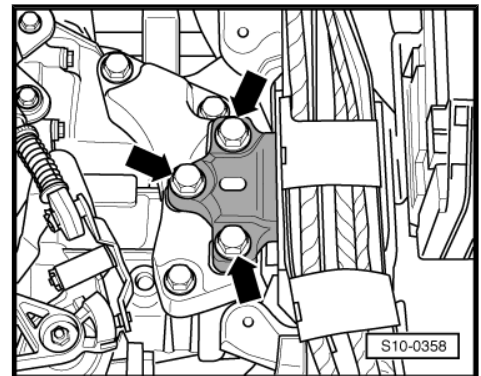


- Successively release screws for gearbox mounting -arrows-.



Note

- ◆ Check whether all hose and line connections between engine, gearbox and body are released.
- ◆ When lowering carefully guide the engine with the gearbox, in order to avoid damage.
- Carefully lower engine with gearbox. During this procedure, turn or move the engine with the gearbox depending upon the constriction.
- Remove the gearbox from the engine.



1.1.1 Removing and installing engine trim panel

Removing



Caution

The brackets of the engine cover on the cylinder head cover can break off when they are incorrectly removed.

- ◆ Therefore, the engine cover must always be removed according to the following instructions.

- Successively slacken the engine cover in the marked sequence -1 ... 4- from the fixing points. To do so, grip the engine cover from underneath as far as possible in the area of the -arrows- and pull it upwards out of the attachment.

Install

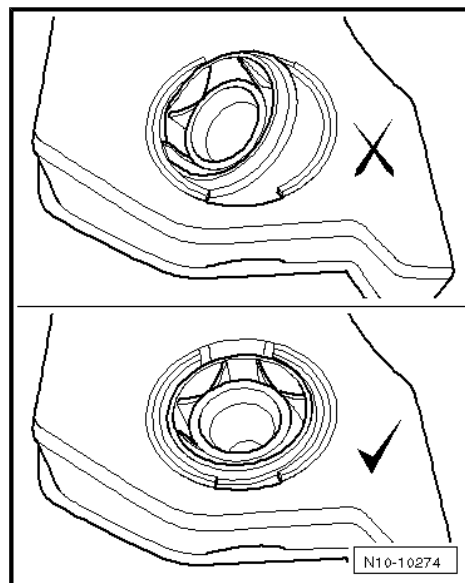


Caution

Before installing the engine cover, check the correct position of the 4 fixing elements (ball sockets); if necessary they must be put back into their position. Otherwise this can lead to damage to the engine cover.



- If necessary, press the ball sockets of the engine cover into the correct position.
- Place the engine cover onto the fixing points and press it into the catch at the corners.



1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

- ♦ Engine mount -MP 1-202-
- ♦ Hook -MP 1-202/10-
- ♦ Assembly stand -MP 9-101-
- ♦ Lifting device -MP 9-201 (2024A)-
- ♦ Bushing -T30010 (VW 540/1B)-
- ♦ Workshop crane , e.g. -VAS 6100-
- Separate engine from gearbox.



WARNING

Use securing pins on the hooks and rig pins to prevent release.

- Attach lifting device -MP 9-201- at engine and at workshop crane , e.g. -VAS 6100- .

On the belt pulley side:

- ♦ 2. Hole of the attachment in Position 1

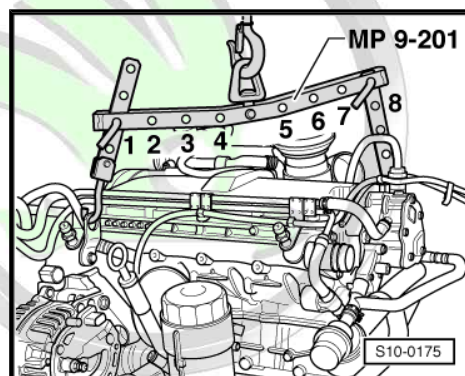
On the flywheel side:

- ♦ 4. Hole of the attachment in Position 8



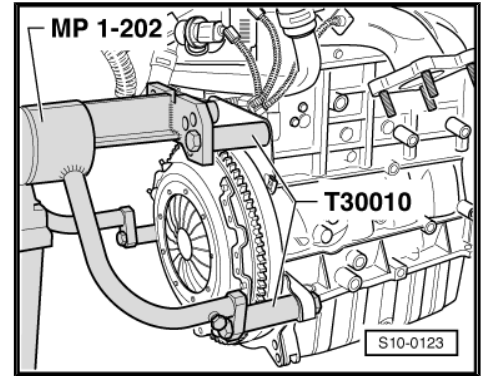
Note

The illustration shows the pump injector engine. The attachment for the Common Rail engine occurs in the same way.



- Raise the engine with installed engine mount -T10012- from the engine and gearbox jack using the workshop crane .
- Remove engine mount -T10012- .

- For carrying out assembly work, attach the engine with the engine mount -MP 1-202-, the hook - MP 1-202/10- and the sleeves -T30010- to the assembly stand -MP 9-101- (the figure shows the 1.9 ltr./47kW SDI Engine; the fixing system is identical).



1.3 Installing the engine

Special tools and workshop equipment required

- ◆ Grease -G 000 100- for manual gearbox
- ◆ High temperature grease -G 052 133 A2- for automatic gearbox
- Fit engine and gearbox using engine mount onto engine and gearbox jack .

Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ *Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ⇒ [page 2](#) .*
- ◆ *When undertaking assembly replace self-locking nuts and screws which have been tightened to a torquing angle.*
- ◆ *Always replace gasket rings and seals.*
- ◆ *All cable straps should be fitted on again in the same place when installing.*
- ◆ *Secure all hose connections with corresponding hose clamps ⇒ [Electronic Catalogue of Original Parts](#) .*



Caution

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*



Engines for manual gearboxes



Note

- ◆ *Clean the serration of the drive shaft and if the clutch disc has been used clean the hub serration, remove corrosion and only apply a very thin layer of grease -G 000 100- on the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Always remove all excess grease.*
- ◆ *After installing the coupling, check the centering of the clutch disc ⇒ Gearbox; Rep. Gr. 30 .*
- ◆ *Check the clutch release bearing for wear. Replace release bearing if worn ⇒ Gearbox; Rep. Gr. 30 .*

Engines without coupling for the automatic gearbox

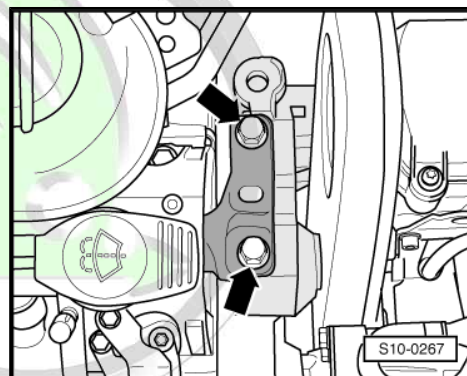
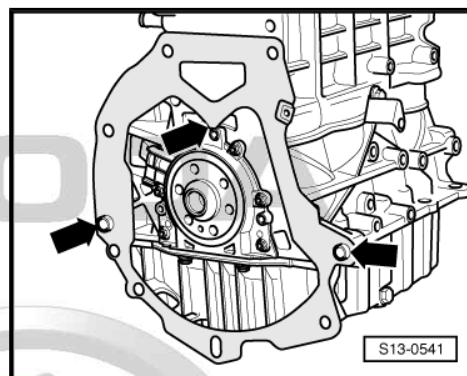
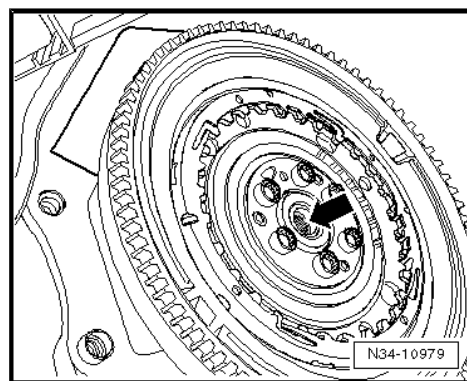


Note

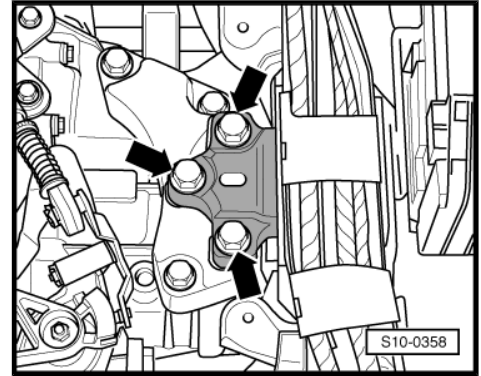
- ◆ *Check needle bearing for drive shaft pin in the crankshaft. Replace bearing if worn ⇒ [page 60](#) .*
- ◆ *Lubricate needle bearing and drive shaft pin with a thin layer of high temperature grease -G 052 133 A2- . Do not grease the serration of the drive shaft.*

Continued for all engines

- Check whether the dowel sleeves for centering the engine/gearbox are present in the cylinder block; insert if necessary.
- Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.
- Screw on gearbox to engine ⇒ Gearbox; Rep. Gr. 34 .
- Insert engine with gearbox into the body.
- Successively screw in by hand the new screws for engine mounting -arrows-.



- Successively screw in by hand the new screws for gearbox mounting -arrows-.
- Align engine and gearbox mount and tighten screws
⇒ [page 24](#) .
- Remove engine mount -T10012- from engine.
- Install pre-exhaust pipe with diesel particle filter
⇒ [page 203](#) .



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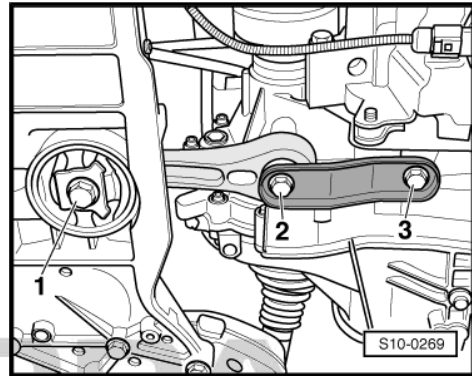
- First tighten pendulum support with new screws -2- and -3- at gearbox and then tighten with new screw -1- at assembly carrier.
- Install left and right drive shaft ⇒ Gearbox; Rep. Gr. 40 .

Engines for manual gearboxes

- Connect hydraulic line to breather/slave cylinder and bleed the clutch hydraulic ⇒ Manual Gearbox; Rep. Gr. 30 .
- Attach shift mechanism to gearbox and adjust ⇒ Gearbox; Rep. Gr. 34 .

Engines for automatic gearbox

- Attach the shift mechanism to the gearbox ⇒ Automatic Gearbox; Rep. Gr. 34 .



Continued for all engines

- Attach AC compressor to holder for auxiliary units ⇒ [page 29](#) .
- Install the V-ribbed belt ⇒ [page 31](#) .
- Install radiator ⇒ [page 132](#) .
- Install fan shroud with fans ⇒ [page 132](#) , to do so ensure adequate clearance of the blower motors.
- Connect all connecting, fuel, coolant, vacuum and suction hoses to the engine.
- Connect electrical connections and attach cables ⇒ Current flow diagrams and Fitting locations.
- Carry out cohesive work when reconnecting the battery ⇒ Electrical System; Rep. Gr. 27 .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work; Rep. Gr. 66 .
- Install wiper arms ⇒ Electrical System; Rep. Gr. 92 .
- Top up coolant ⇒ [page 111](#) .
- Checking the oil level ⇒ Maintenance ; Octavia II .
- Install the noise insulation ⇒ Body Work; Rep. Gr. 50 .
- Install the bottom part of the right and left wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .
- Perform a test drive.
- Interrogate all fault memories, rectify any faults existing and erase fault memory ⇒ Vehicle diagnosis, testing and information system VAS 5051.

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Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

Tightening torques

Component		Nm
Screws/nuts	M6	10
	M7	15
	M8	20
	M10	40
	M12	70
Engine/gearbox connecting screws ⇒ Gearbox; Rep. Gr. 34		

1.4 Unit mounting - summary of components

1 - Screw

- ☐ Tightening torque ⇒
Gearbox; Rep. Gr. 34

2 - Screws

- ☐ replace
- ☐ Strength category 8.8:
40 Nm + torque a further
90° (1/4 turn).
- ☐ Strength category 10.9:
50 Nm + torque a further
90° (1/4 turn).

3 - Engine support bracket

- ☐ removing and installing
⇒ [page 25](#)

4 - 40 Nm + torque a further 180° (1/2 turn)

- ☐ replace
- ☐ observe the order of
tightening up
⇒ [page 25](#)

5 - Engine mounting

- ☐ installing ⇒ [page 24](#)
- ☐ The bracket for the ad-
ditional fuel pump -
V393- is screwed onto
the engine mount

6 - 40 Nm + torque a further 90° (1/4 turn)

- ☐ replace

7 - Connecting stud

8 - 20 Nm + torque a further 90° (1/4 turn)

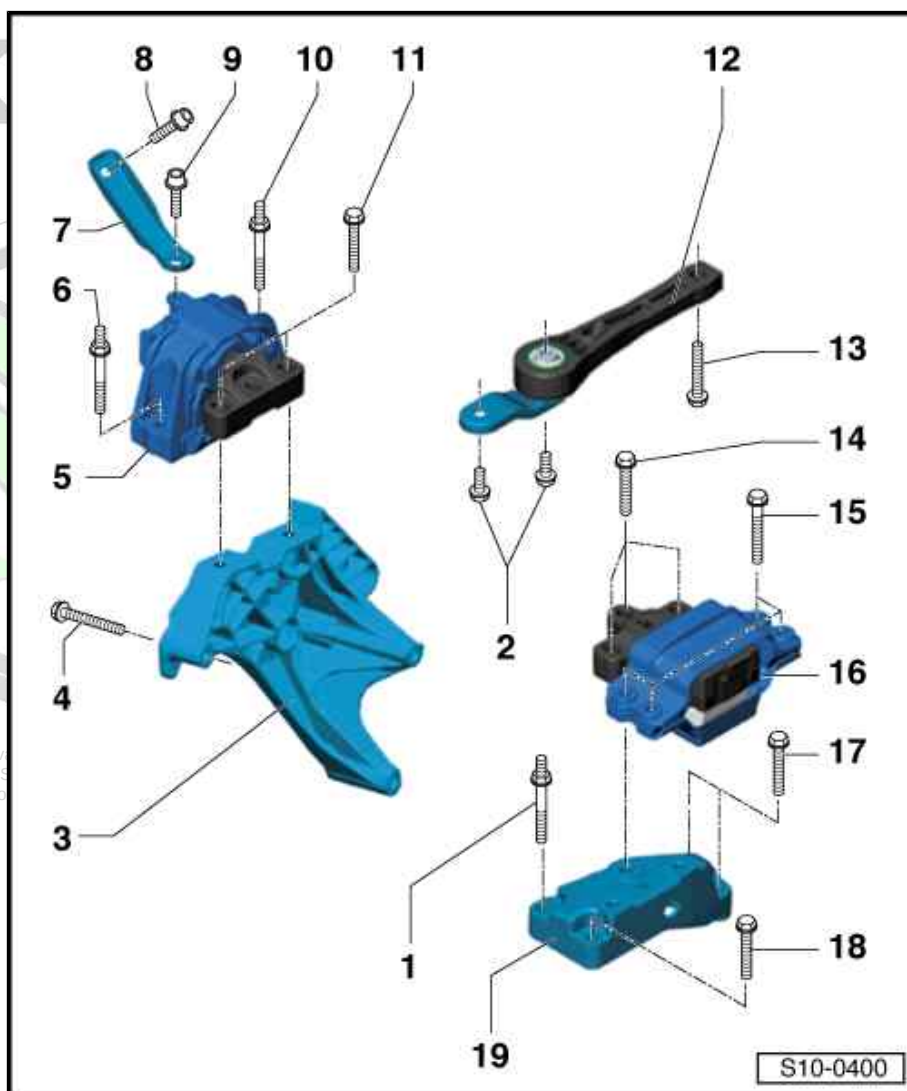
- ☐ replace

9 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace

10 - 40 Nm + torque a further 90° (1/4 turn)

- ☐ replace





11 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

12 - Pendulum support

13 - 100 Nm + torque a further 90° (1/4 turn)

- ☐ replace

14 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

15 - 40 Nm + torque a further 90° (1/4 turn)

- ☐ replace

16 - Gearbox mount

17 - Screw

- ☐ Tightening torque ⇒ Gearbox; Rep. Gr. 34

18 - Screw

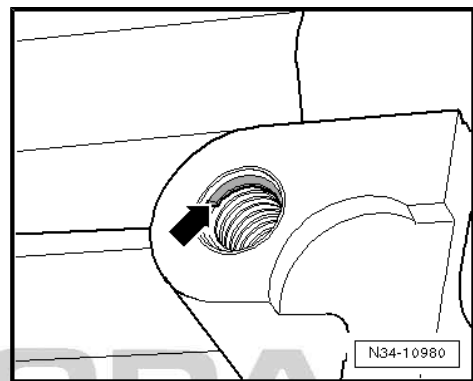
- ☐ Tightening torque ⇒ Gearbox; Rep. Gr. 34

19 - Gearbox support bracket



Note

- ◆ Remove pendulum support: First remove screw -13-, then screws -2-.
- ◆ Install pendulum support: First tighten screws -22-, then screw -13-.
- ◆ On manual gearbox MQ350 (02Q), only use the screws with the strength category 10.9 if threaded inserts have been installed (e.g. HeliCoil) -arrow-.



1.5 Adjusting the unit mounting

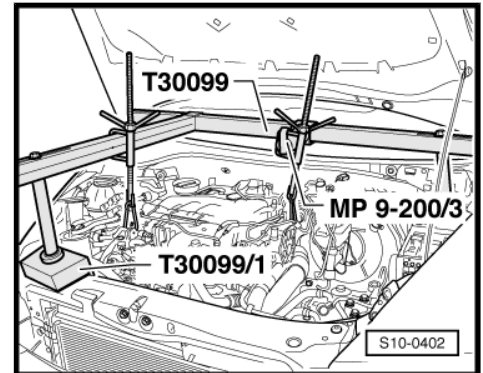
Special tools and workshop equipment required

- ◆ Supporting device -T30099-
 - ◆ Supporting plate -T30099/1-
 - ◆ Adapter -MP9-200/3 (10-222A/3)-
- or
- ◆ Engine mount -T10012-
 - ◆ Engine and gearbox jack , e.g. -V.A.G 1383 A -



Condition

- Engine with gearbox supported with supporting device - T30099 - , shim -T30099/1- and adapter -MP9-200/3 - or engine with gearbox supported with engine mount -T10012- and engine/gearbox jack -V.A.G 1383 A - .



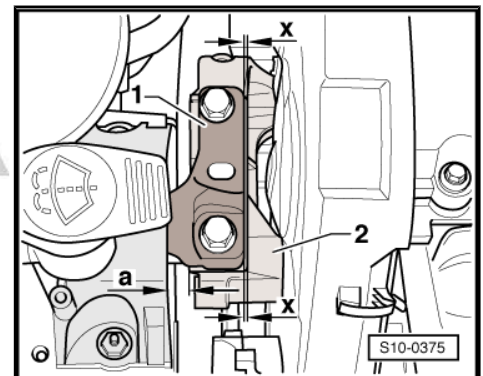
The following distances -a- and -x- must be achieved:

- Between engine bracket and engine support there must be a distance -a- = 10 mm.
- The cast iron edge on the engine support -2- must be parallel to the supporting arm -1- the dimension -x- must be the same at the front and rear.



Note

The distance -a- = 10 mm can be checked e.g. with suitable round bars.



Tightening torques of the unit mounting ➔ [page 23](#) .

1.6 Removing and installing engine support

Special tools and workshop equipment required

- ◆ Supporting device -T30099-
- ◆ Supporting plate -T30099/1-
- ◆ Adapter -MP9-200/3 (10-222A/3)-

Removing



Caution

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

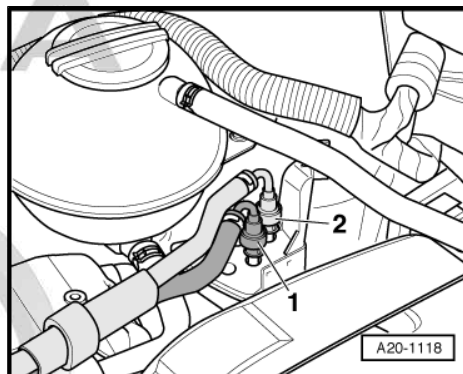
- ◆ Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.
- ◆ In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.



Note

- ◆ Safety precautions when working on the fuel supply system ➔ [page 3](#) .
- ◆ Observe rules for cleanliness ➔ [page 6](#) .

- Switch off the ignition and pull out the ignition key.
- Remove engine cover ➔ [page 17](#) .
- Separate fuel feed line -2- and fuel return-flow line -1-, to do so press in securing ring.



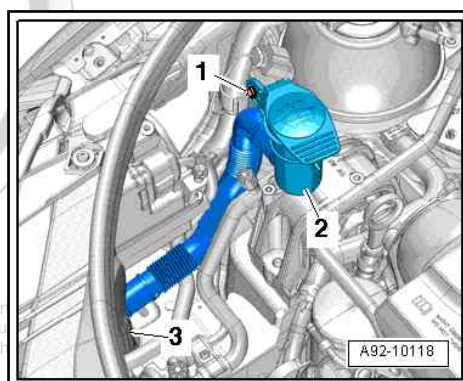
- Release screw -1-.
- Push the filler tube with the filler neck -2- for the washer-fluid reservoir to the side.



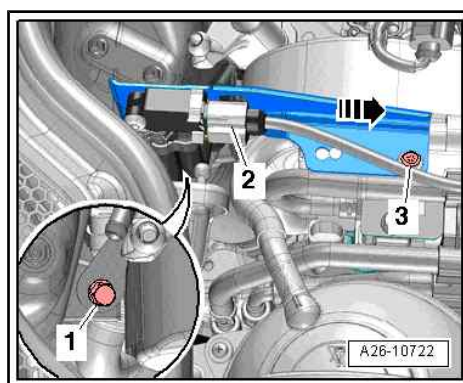
Note

The fuel filter is not shown to simplify the illustration.

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- Disconnect plug -2- at exhaust gas pressure sensor 1 -G450- .
- Screw out screw -3- and remove bracket with exhaust gas pressure sensor 1 -G450- from the bracket for the additional fuel pump in -direction of arrow-.
- Place the bracket with the exhaust gas pressure sensor 1 -G450- to the rear.

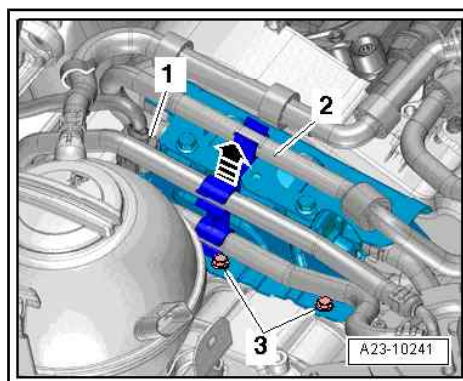


Caution

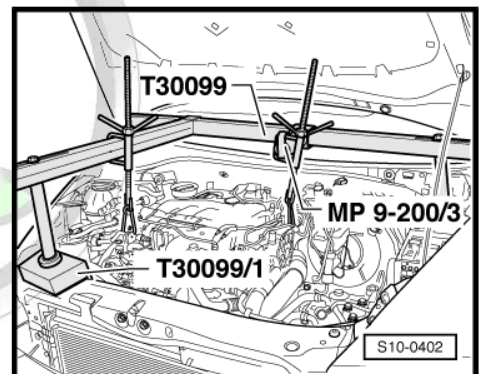
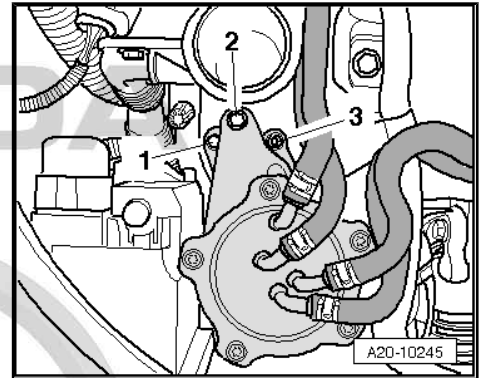
Risk of damage!

- ♦ *The exhaust gas pressure sensor 1 -G450- is very sensitive and must not touch somewhere when laying it down with the bracket.*

- Unhook fuel hose -2- from bracket.
- Remove the bracket for the fuel lines upwards -arrow- and place it to the side.
- Disconnect plug connection -1- at the additional fuel pump - V393- .
- Unscrew bolts -3-.
- Unplug connector from compensation bottle.
- Unscrew screw for compensation bottle.



- Release screw -1- by two turns.
- Release screw -2- and nut -3-.
- Unclip bracket for coolant line at fuel filter.
- Lay the compensation bottle with the hoses connected, the fuel filter with the hoses connected and the bracket with the additional fuel pump -V393- onto the engine.
- Remove the cooling water tank cover ⇒ Body Work; Rep. Gr. 66 .
- Position the supporting device -T30099- with the shim -T30099/1 - and the adapter -MP9-200/3- and support the engine in its installed position.
- Uniformly pre-tension the engine/gearbox unit with both spindles, do not raise.
- Remove the engine mount.
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .



WARNING

Make sure that no components/hoses are damaged, over-stretched or torn off when lifting and lowering the engine with the supporting device -T30099- .



Note

The fixing screw -1- can be reached through an opening in the wheelhouse. If necessary, lift and lower the engine with the spindle of the supporting device -T30099- in order to remove the screws -2- and -3-.

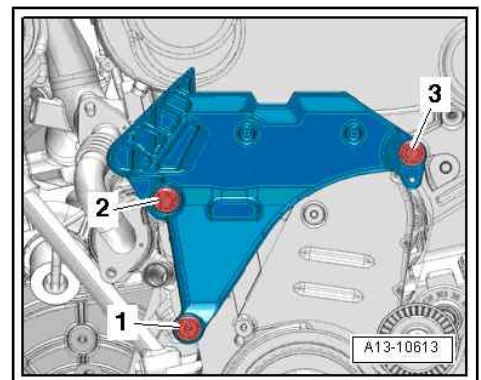
- Unscrew the fixing screws for the engine support in the sequence -3 - 2 - 1-.
- Remove the engine support to the top.

Install



Caution

The tightening sequence and the tightening torque of the fixing screws for the engine support must definitely be respected. Otherwise stress of the engine support occurs, which results in the breaking of the engine support.



Installation occurs in reverse order. Pay attention to the following:

- Insert the engine support from the top.

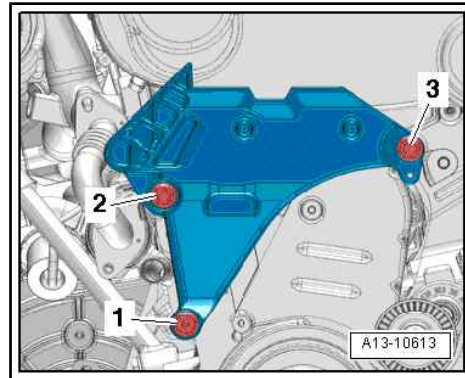
**Note**

The installation of the fixing screw -2- is possible through the hole in the wheelhouse. If necessary, raise or lower the engine via the spindles of the supporting device -T30099- so that the screws -1- and -3- can be inserted.

- Then tighten the fixing screws in the tightening sequence -1 - 2 - 3-: 7 Nm
- Tighten fixing screws in the sequence -1 - 2 - 3- to tightening torque: 40 Nm + torque a further 180° (1/2 turn).
- Install engine mounting with new screws.
- Check the adjustment of the engine mounting ⇒ [page 24](#) .
- Tighten screws for engine mount ⇒ [page 23](#) .

Further installation occurs in reverse order. Pay attention to the following:

- ◆ Make sure the fuel lines fit tightly.
- ◆ Do not mix-up the feed line and the return-flow line (the return-flow line is blue or has a blue marking, the feed line is black).



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13 – Crankgear

1 Disassembling and assembling engine

1.1 V-ribbed belt drive and bracket for auxiliary units - Summary of components

1 - V-ribbed belt

- ☐ removing and installing
⇒ [page 31](#)
- ☐ check for wear
- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ do not kink
- ☐ pay attention to the correct position on the belt pulley when installing it.

2 - Tensioner for V-ribbed belt

- ☐ removing and installing
⇒ [page 32](#)

3 - Crankshaft-belt pulley

- ☐ with vibration damper
- ☐ pay attention to correct installation position
⇒ [page 30](#)
- ☐ removing and installing
⇒ [page 33](#)

4 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

5 - 23 Nm

6 - Fitting sleeve

- ☐ pay attention to correct fit in the bracket for auxiliary units
- ☐ the dowel sleeve is located in the top right screw hole ⇒ [page 30](#)

7 - Screw

- ☐ Tightening torque: ⇒ [page 183](#)

8 - 50 Nm + torque a further 90° (1/4 turn)

- ☐ replace

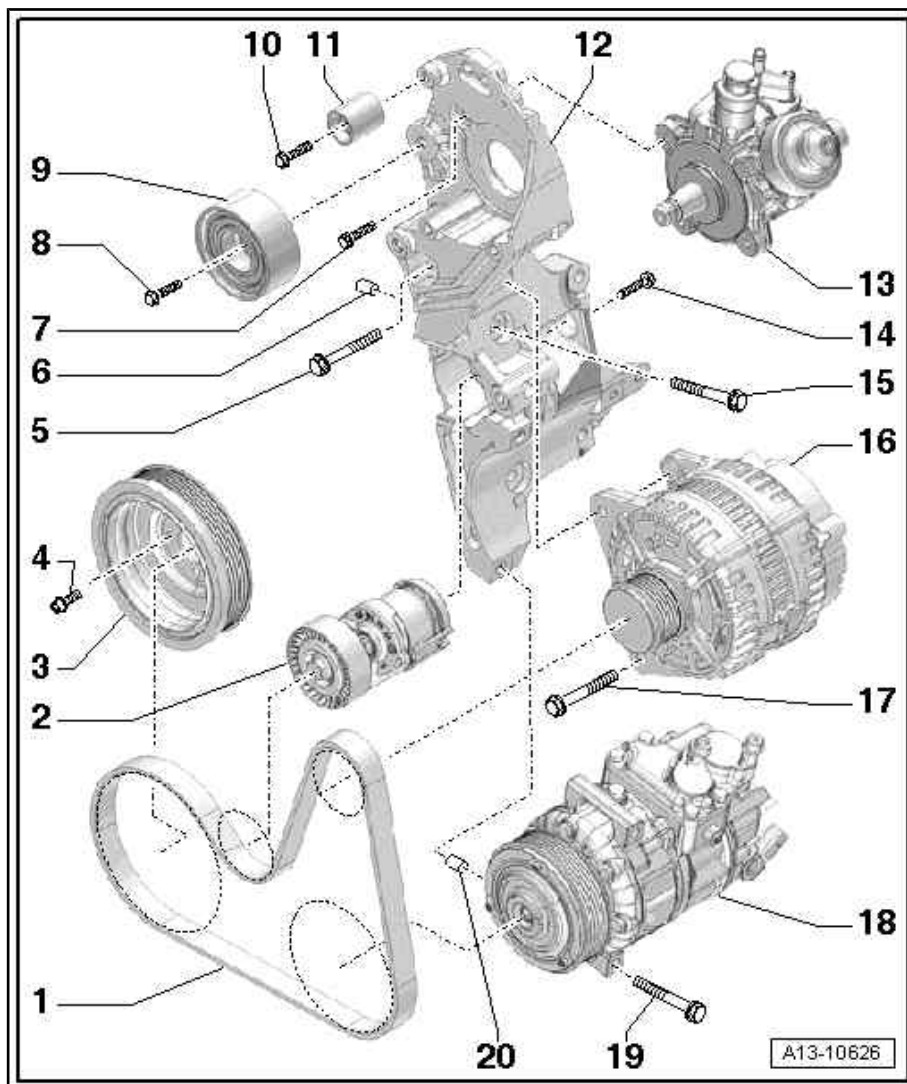
9 - Guide pulley

- ☐ for toothed belt

10 - 20 Nm

11 - Guide pulley

- ☐ for toothed belt



12 - Bracket for auxiliary units

- ☐ removing and installing ➔ [page 33](#)
- ☐ the front right lifting eye at the bracket is attached in the same way as the front left lifting eye on the cylinder head ➔ [page 72](#)

13 - High pressure pump

- ☐ removing and installing ➔ [page 183](#)

14 - 20 Nm + torque a further 180° (1/2 turn)

- ☐ replace

15 - Screw

- ☐ replace
- ☐ Tightening torque and tightening order ➔ [page 30](#)

16 - AC generator

- ☐ removing and installing ➔ Electrical System; Rep. Gr. 27

17 - 23 Nm

18 - AC compressor

- ☐ removing and installing ➔ Heating, Air Conditioning; Rep. Gr. 87

19 - 23 Nm

20 - Fitting sleeve

- ☐ pay attention to correct fit in the holder

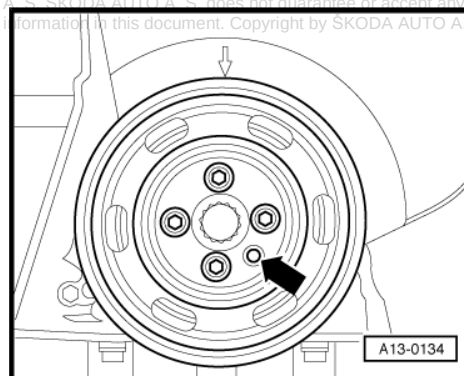
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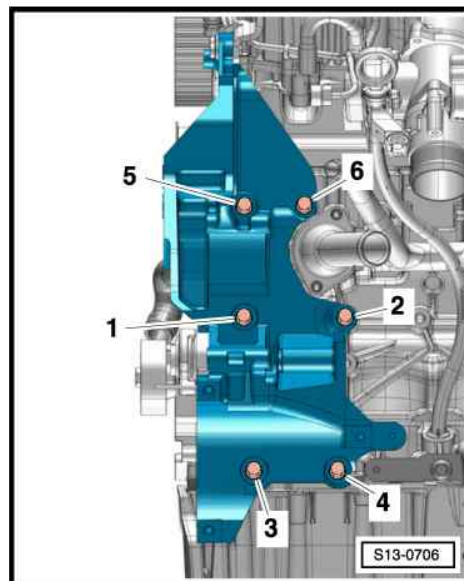
Fitting position of the crankshaft-belt pulley

- The hole -arrow- in the crankshaft-belt pulley must be positioned above the lobe on the timing belt sprocket - crankshaft.



Bracket for auxiliary units - tightening order and tightening torques

- A dowel sleeve must be located between the bracket for auxiliary units and the cylinder block in the area of the screw hole -6-.
- Insert new screws for the bracket for auxiliary units as follows:
 - ◆ Screws -1- and -2- M10x52
 - ◆ Screws -3- and -4- M10x30
 - ◆ Screws -4- and -6- M10x60
- Gradually tighten the screws for the bracket for auxiliary units in the sequence -1...6-:
 1. Screw in all the screws by hand.
 2. Tighten all screws to 40 Nm.
 3. Turn the screws -3- and -4- a further 45°.
 4. Turn the screws -1, 2, 5, 6- a further 90°.



1.2 Removing and installing V-ribbed belt

Special tools and workshop equipment required

- ◆ Locking pin -T10060 A-

Removing

- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the right wheelhouse liner bottom part ⇒ Body Work; Rep. Gr. 66 .

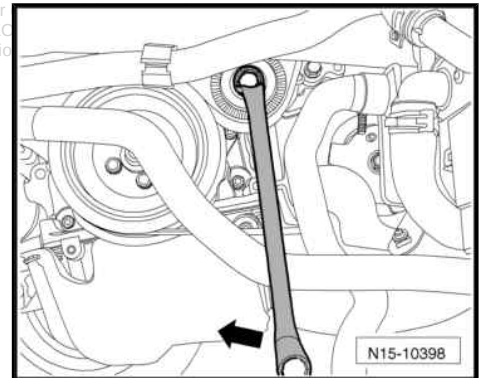


Caution

Risk of damage through reversing the rotation direction of an already used V-ribbed belt.

- ◆ *If it is intended to re-install the V-ribbed belt, mark the direction of rotation with chalk or a felt-tip pen before removing it.*

- Swing the tensioning element in -the direction of the arrow-
detension the V-ribbed belt.



- Align the holes -arrows- and lock the tensioning element using the locking pin - T10060 A- .
- Remove the V-ribbed belt.

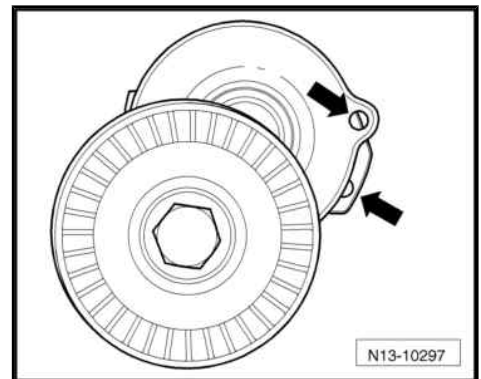
Install

Installation is performed in the reverse order, pay attention to the following points:



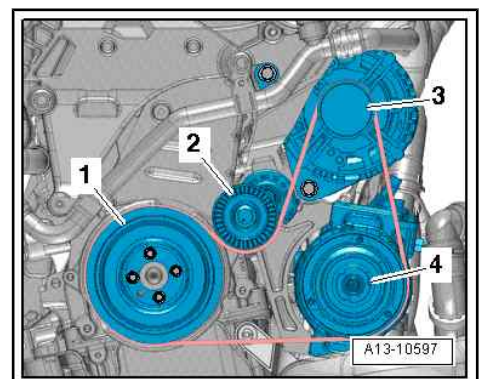
Note

Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.

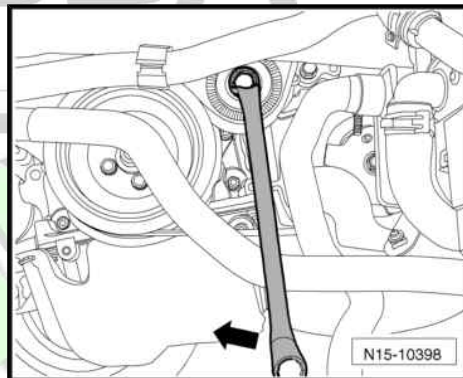


- Lay the V-ribbed belt onto the V-ribbed belt pulleys.

- 1 - Crankshaft
- 2 - Tensioning element
- 3 - AC generator
- 4 - AC compressor



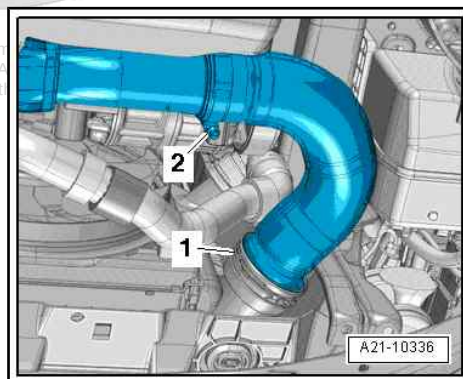
- Hold the tensioning element with the ring spanner and pull out the locking pin -T10060 A- .
- Release the tensioning element.
- Check correct positioning of the V-ribbed belt.
- Start engine and check V-ribbed belt run.



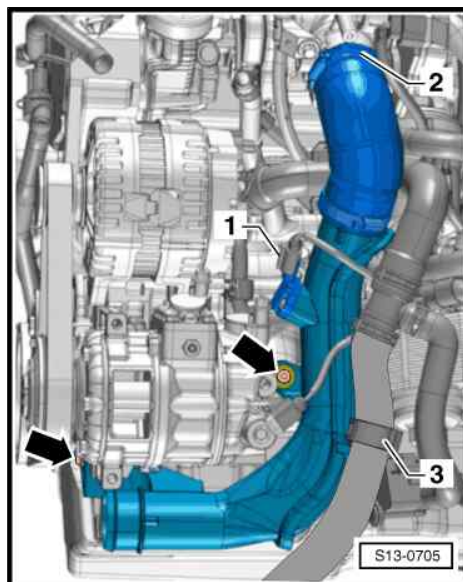
1.3 Removing and installing tensioning element for V-ribbed belt

Removing

- Remove V-ribbed belt from tensioning element ➔ [page 31](#) .
- Remove the right charge air hose, to do so loosen the hose clamp -2- and slightly raise the retaining clip -1-.
- Remove fan shroud with radiator ➔ [page 132](#) .



- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.

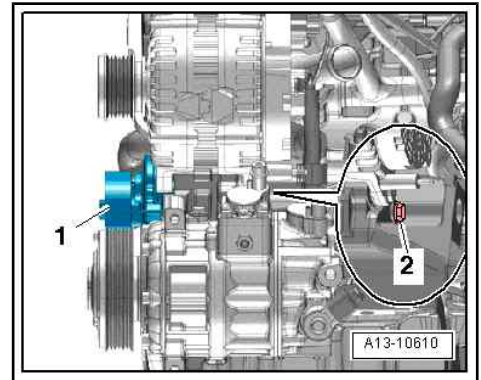


- Release screws -2- and remove tensioning element -1- for V-ribbed belt.

Install

Installation is performed in the reverse order, pay attention to the following points:

- ◆ Tightening torques: ➔ [page 29](#)
- Replace the screw for the tensioning element for the V-ribbed belt.
- Install the V-ribbed belt ➔ [page 31](#) .



1.4 Removing and installing crankshaft-belt pulley

Removing

- Remove V-ribbed belt ➔ [page 31](#) .
- Loosen the screws for the crankshaft-belt pulley, to do so counterhold the screw for the timing belt sprocket - crankshaft using the ring spanner.
- Release screws and remove crankshaft-belt pulley.

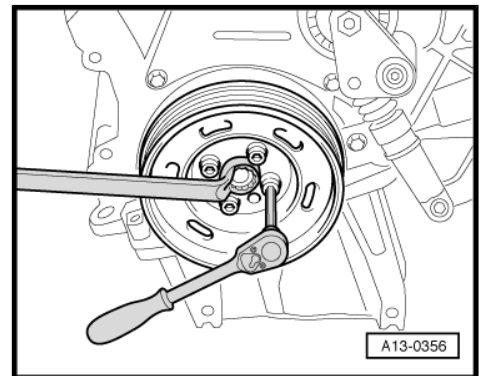
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ Pay attention to the fitting position of the crankshaft belt pulley ➔ [page 30](#) .
- ◆ Replace the screws for the crankshaft-belt pulley.
- ◆ Tightening torques: ➔ [page 29](#)



1.5 Removing and installing bracket for auxiliary units

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Special tools and workshop equipment required

- ◆ Supporting device -T30099-
- ◆ Supporting plate -T30099/1-
- ◆ Adapter -MP 9-200/3 (10-222/3)-
- ◆ Ring bolt -3368-
- ◆ Collar nut M10

Removing

- Remove the generator ➔ Electrical System; Rep. Gr. 27 .
- Remove the high pressure pump ➔ [page 183](#) .



WARNING

Refrigerant circuit of the air conditioning system must not be opened.



Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

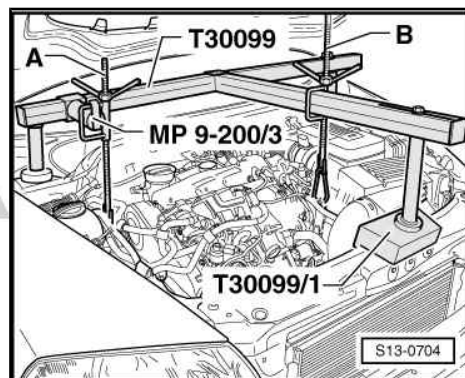
- Remove the AC compressor from the bracket for auxiliary units and attach to the lock carrier.
- Remove the cooling water tank cover ⇒ Body Work; Rep. Gr. 66 .
- Insert the supporting device -T30099- with the shim -T30099/1 - and the adapter -MP9-200/3- and attach the spindle -B-.



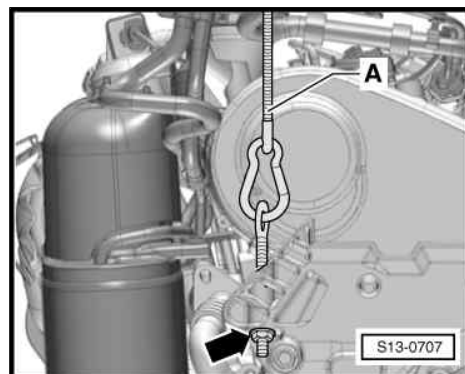
WARNING

Risk of accident due to loosened screwed connection.

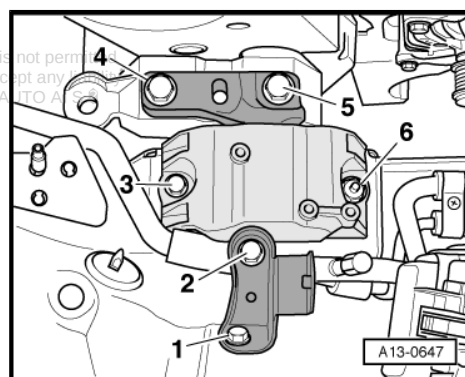
- ◆ **Screw the collar nut or the nut with the washer at least 6 turns in order to stabilise the ring bolt -3368- .**



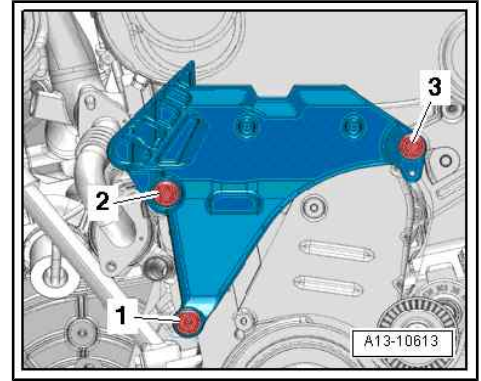
- Tighten the ring bolt -3368- with the collar nut M10 or the nut with the washer -arrow- at the engine support, as shown in the illustration.
- Hook the spindle -A- onto the ring bolt -3368- .
- Uniformly pre-tension the engine with both spindles, do not raise.



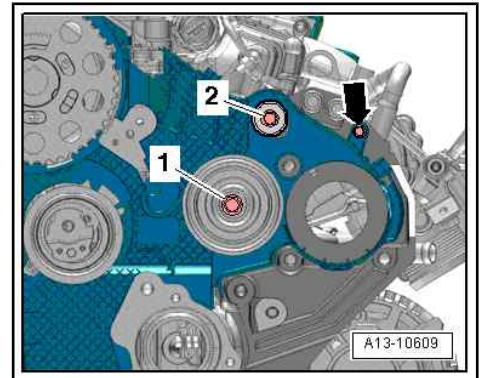
- Release screws -1- and -2-, remove connecting stud.
- Release screws -3...6- and remove engine mounting.



- Release screw -3- on the engine support.



- Release screw -arrow-.
- Release screws -1- and -2-, remove toothed belt camshaft drives.



- Release screws -1...6- and remove bracket for auxiliary units.

Install

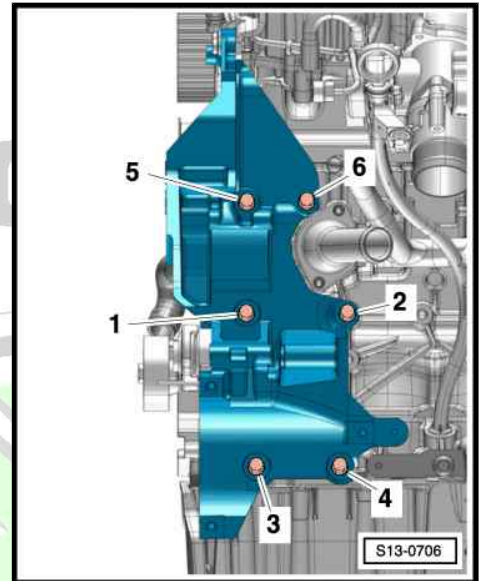
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace screws which have been tightened to a torquing angle.

- If no dowel sleeve is present on the top right between the bracket for auxiliary units and the cylinder block, insert a dowel sleeve.
- Tighten the screws for the bracket for auxiliary units ⇒ [page 30](#) .
- Install engine support and engine mount ⇒ [page 23](#) .
- Install high pressure pump ⇒ [page 183](#) .
- Installing the timing belt ⇒ [page 42](#) .
- Install generator ⇒ Electrical system; Rep. Gr. 27 .
- Attach AC compressor to holder for auxiliary units ⇒ [page 29](#) .



1.6 Timing belt - Summary of components

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1 - Toothed belt

- ☐ before removing mark running direction
- ☐ check for wear
- ☐ do not kink
- ☐ removing and installing ⇒ [page 37](#)

2 - 20 Nm

3 - Guide pulley

4 - 50 Nm + torque a further 90° (1/4 turn)

- ☐ replace

5 - 20 Nm + torque a further 45° (1/8 turn)

6 - Tensioning pulley

- ☐ remove engine support for removing and installing ⇒ [page 25](#)

7 - 20 Nm + torque a further 45° (1/8 turn)

- ☐ replace

8 - Timing belt gear - camshaft

9 - Guide pulley

10 - 20 Nm

11 - 100 Nm

- ☐ to release and tighten use counterholder - T10051-

12 - Hub

- ☐ for camshaft
- ☐ with rotor
- ☐ to remove use extractor -T10052-
- ☐ removing and installing ⇒ [page 88](#)

13 - 9 Nm

14 - Rear toothed belt guard

15 - 20 Nm + torque a further 45° (1/8 turn)

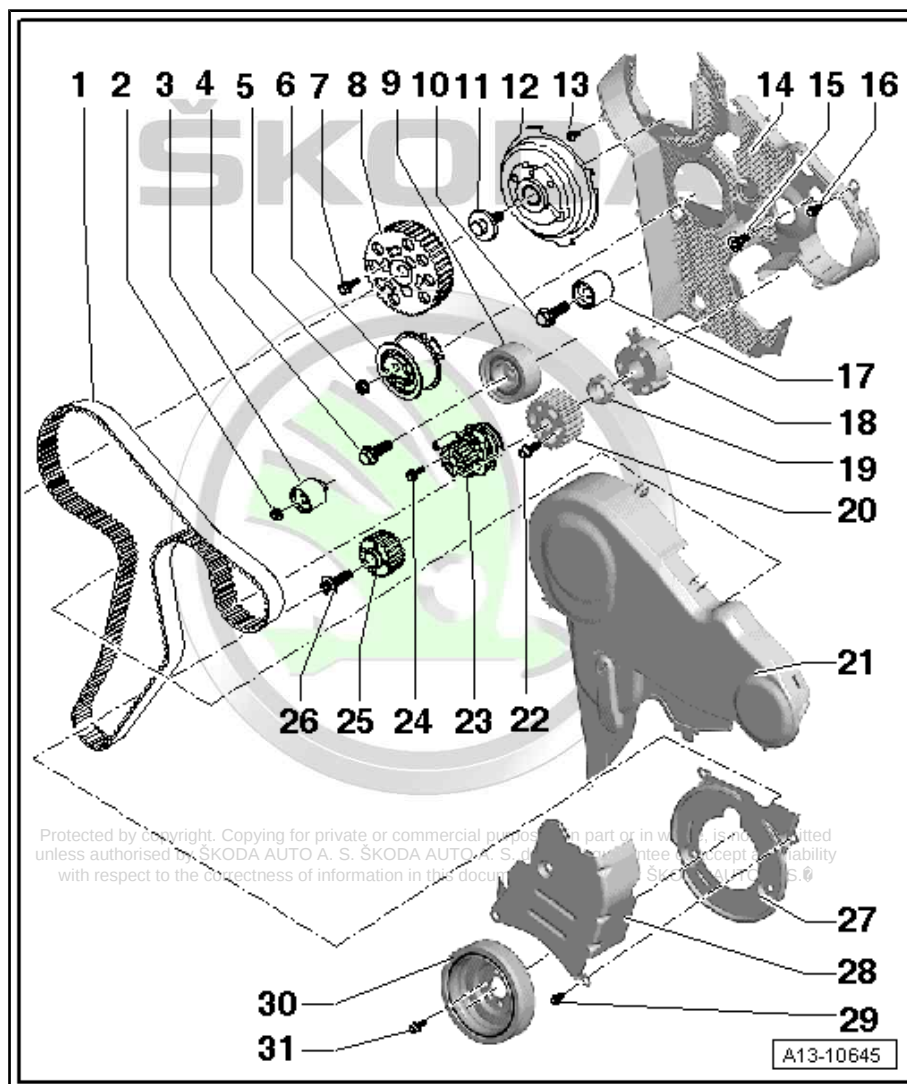
- ☐ replace
- ☐ Attachment of high pressure pump

16 - 9 Nm

17 - Guide pulley

18 - Hub

- ☐ for high pressure pump
- ☐ to release and tighten use counterholder -T10051-
- ☐ to remove use extractor -T40064-
- ☐ removing and installing ⇒ [page 183](#)



19 - 95 Nm

20 - Timing belt gear - high pressure pump

21 - Timing belt guard - top part

22 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace

23 - Coolant pump

- ☐ removing and installing ⇒ [page 115](#)

24 - 15 Nm

25 - Toothed belt sprocket - crankshaft

26 - 120 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ to release and tighten use counterholder -3415-
- ☐ do not apply additional oil or grease to the thread and collar
- ☐ tightening may occur in successive stages

27 - Timing belt guard - bottom part

28 - Timing belt guard - middle part

29 - 9 Nm

- ☐ insert using locking agent -D 000 600 A2- ŠKODA AUTO A. S. does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by ŠKODA AUTO A. S. ©

30 - Crankshaft-belt pulley

- ☐ with vibration damper

31 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

1.7 Removing and installing toothed belt

Special tools and workshop equipment required

- ◆ Rig pin -3359- (2x)
- ◆ Crankshaft arrester -T10050-
- ◆ Locking pin -T10060 A-
- ◆ Counterholder -T10172-
- ◆ Offset screwdriver -T10264-
- ◆ Flywheel lock -T10265-
- ◆ Pliers for spring strap clamps



1.7.1 Removing



Caution

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

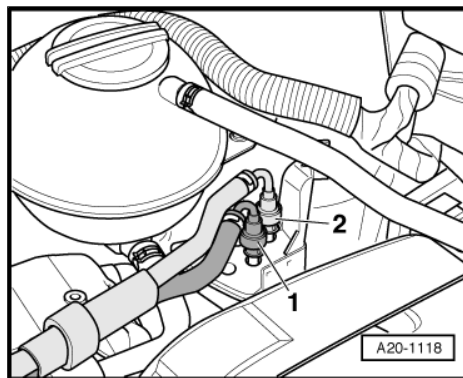
- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*



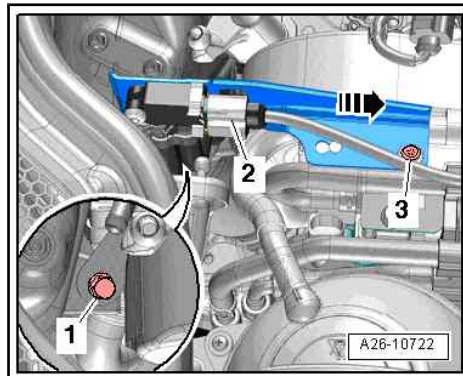
Note

- ◆ *Safety precautions when working on the fuel supply system ➔ [page 3](#).*
- ◆ *Observe rules for cleanliness ➔ [page 6](#).*
- ◆ *The engine support does not have to be removed in order to remove the camshaft sprocket.*
- The shift lever must be in Neutral or the selector lever in position "N" in order to turn the crankshaft.
- Switch off the ignition and pull out the ignition key.
- Remove engine cover ➔ [page 17](#).
- Separate fuel feed line -2- and fuel return-flow line -1-, to do so press in securing ring.

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- Disconnect plug -2- at exhaust gas pressure sensor 1 -G450-.
- Screw out screw -3- and remove bracket with exhaust gas pressure sensor 1 -G450- from the bracket for the additional fuel pump in -direction of arrow-.
- Place the bracket with the exhaust gas pressure sensor 1 -G450- to the rear.



Caution

Risk of damage!

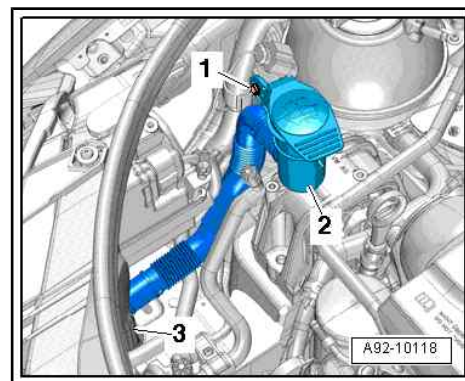
- ◆ *The exhaust gas pressure sensor 1 -G450- is very sensitive and must not touch somewhere when laying it down with the bracket.*

- Release screw -1-.
- Push the filler tube with the filler neck -2- for the washer-fluid reservoir to the side.

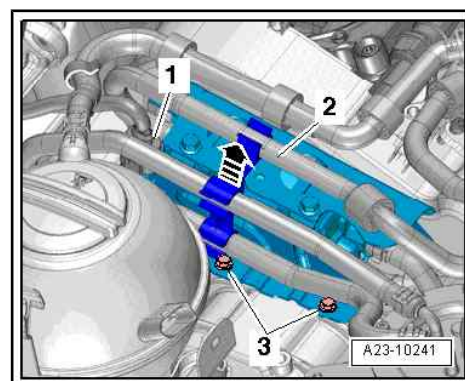


Note

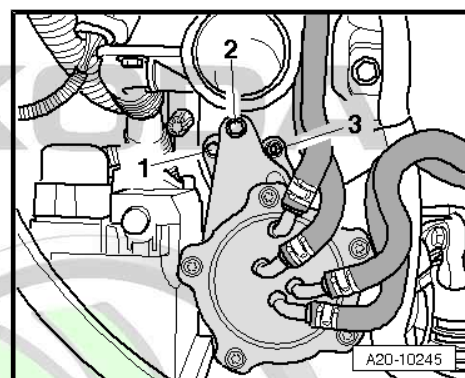
The fuel filter is not shown to simplify the illustration.



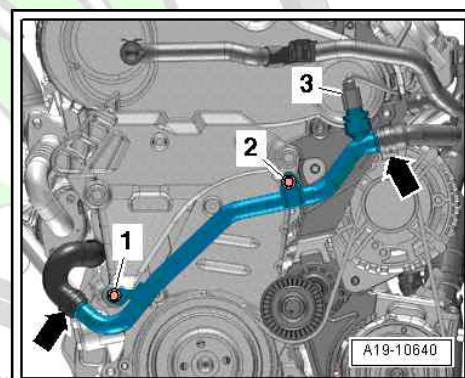
- Unhook fuel hose -2- from bracket.
- Remove the bracket for the fuel lines upwards -arrow- and place it to the side.
- Disconnect plug connection -1- at the additional fuel pump -V393-.
- Unscrew bolts -3-.



- Release screw -1- by two turns.
- Release screw -2- and nut -3-.
- Unclip bracket for coolant line at fuel filter.
- Place the fuel filter with the hoses connected and the bracket together with the additional fuel pump -V393- onto the engine.



- Disconnect plug -3- at the coolant temperature sender at radiator outlet -G83-.
- Release nut -1- and screw -2-.
- Press the right coolant pipe with the hoses connected -arrows- to the side.



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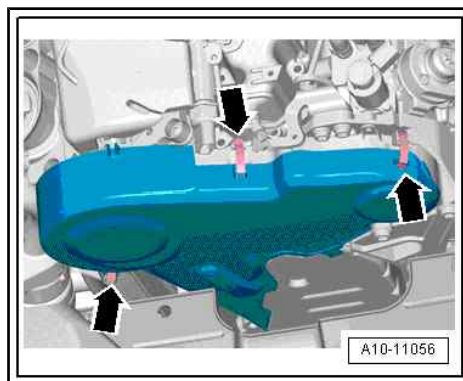


- Remove top part of toothed belt guard; to do so release retaining clips -arrows-.
- Remove crankshaft-belt pulley ➔ [page 33](#) .

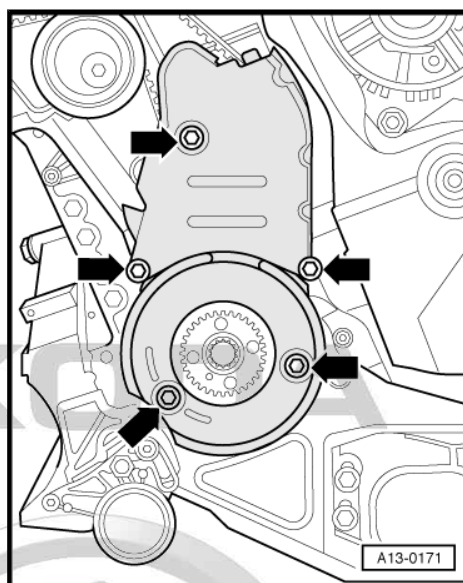


Note

Do not lock tensioning element for V-ribbed belt.



- Release screws -arrows-.
- Remove top part and middle part of toothed belt guard.

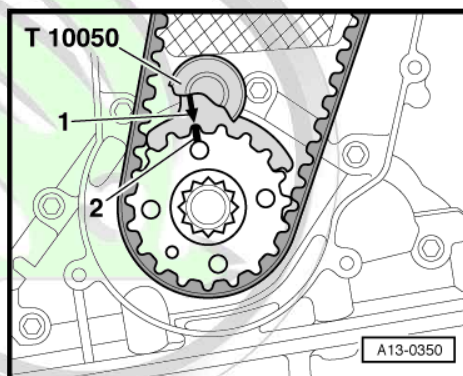


- Rotate the crankshaft on TDC in direction of rotation of the engine and position the timing belt gear - crankshaft with the crankshaft arrester -T10050- . To do so slide the crankshaft arrester from the front side of the timing belt gear into its gearing. The gear segment of the timing belt gear - camshaft must be at the "12 o'clock" position. Otherwise turn the crankshaft a further 360°.



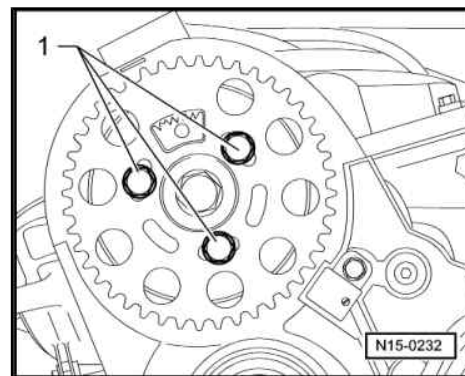
Note

The markings on the timing belt gear - crankshaft -2- and the crankshaft arrester -T10050- -1- must be positioned opposite each other. While doing so, the bolt for the crankshaft arrester -T10050- must engage at the same time in the hole of the sealing flange.

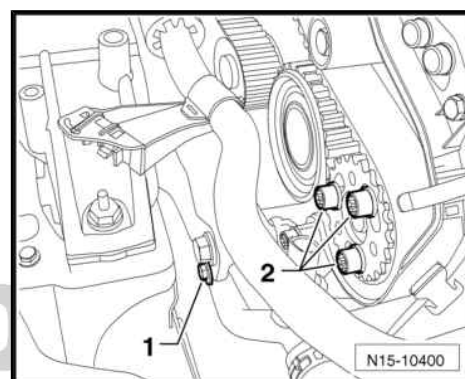


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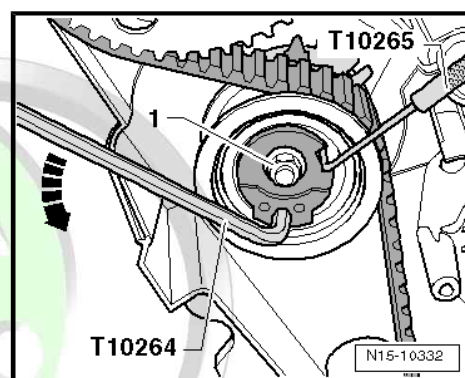
- Unscrew the screws -1- of the timing belt gear - camshaft successively, replace the screws and do not fully screw in the new screws.



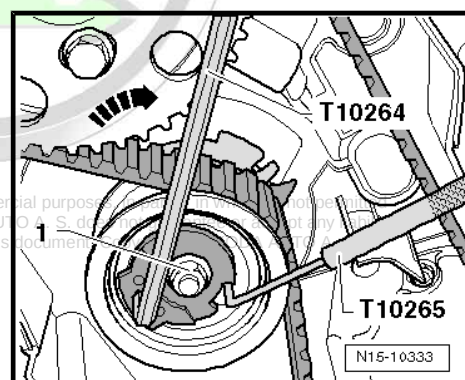
- Unscrew the screws -2- of the timing belt gear - high pressure pump, replace the screws and do not fully screw in the new screws.



- Loosen nut -1- for tensioning pulley.
- Turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- in -direction of arrow- (anti-clockwise) until the tensioning pulley can be interlocked with the rig tool -T10265- .



- Then turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- in the -direction of arrow- up to the stop and tighten the nut -1- by hand.



Caution

Risk of damage through reversing the rotation direction of an already used toothed belt.

- ◆ If it is intended to re-install the toothed belt, mark the direction of rotation with chalk or a felt-tip pen before removing it.

- First of all remove the toothed belt from the large guide pulley and then from the remaining toothed belt gears.

1.7.2 Installing (set the timing)

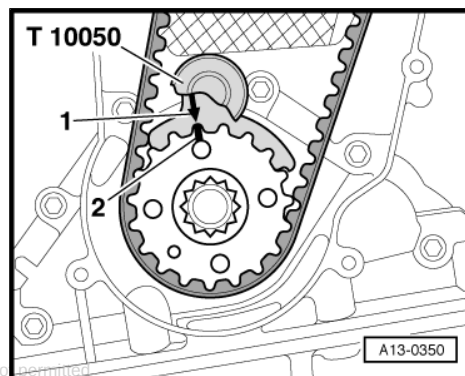
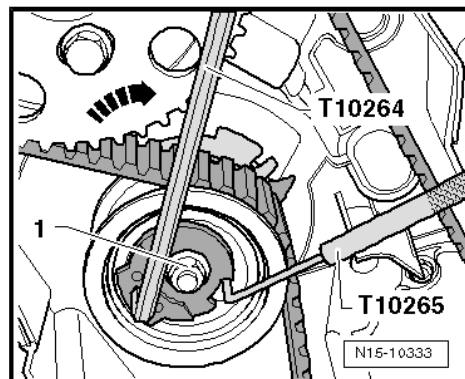


Note

- ♦ *Adjusting work on the timing belt must only be performed on a cold engine, as the position of the pointer of the tensioning element changes depending on the engine temperature.*
- ♦ *If it is intended to replace the tensioning pulley, the engine mount must be removed ⇒ [page 25](#).*

Conditions

- Tensioning pulley locked with rig tool -T10265- and fixed with nut up to right stop.
- Lock the crankshaft with the crankshaft arrester -T10050- .
- Replace and loosely screw in the screws for timing belt gear - camshaft and timing belt gear - high pressure pump. It must still be possible to just turn the timing belt gears however they must not tilt.



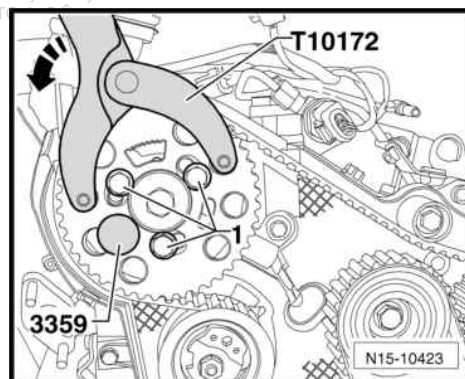
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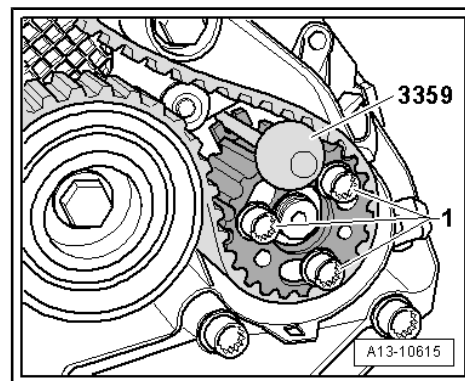
Note

If necessary, turn the hub of the camshaft using the counterholder -T10172- and the adapters -T10172/4- until it can be arrested. To do so tighten at least one fixing screw -1- by hand.

- Lock the hub of the camshaft with the rig pin -3359-. To do so slide the locating pin through the open elongated hole on the outside in the cylinder head bore.
- Loosen again the screws which were tightened by hand.

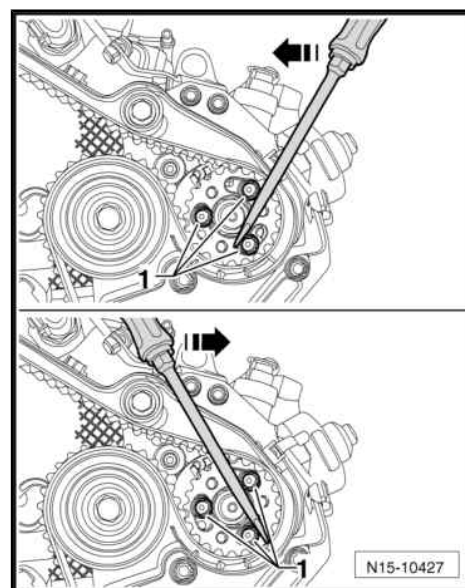


- Lock the hub of the high pressure pump with the locating pin -3359-. To do so slide the locating pin into the fit outside the timing belt gear.



Note

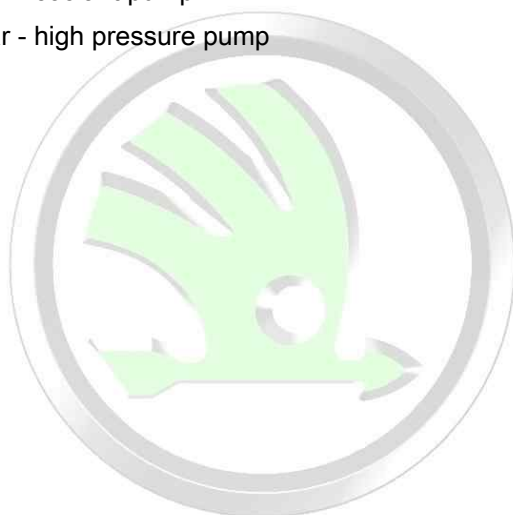
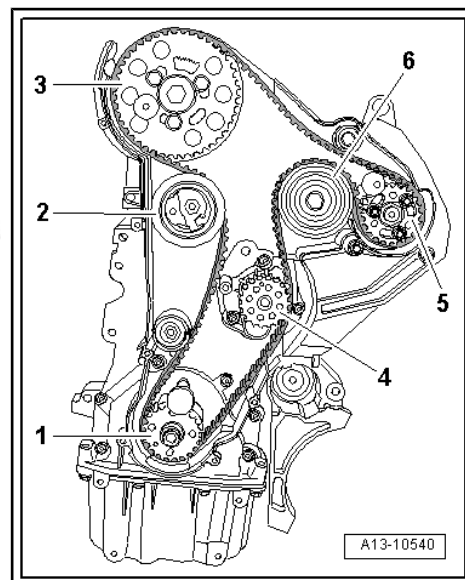
If necessary, use a screwdriver to turn the hub of the high pressure pump at the screw heads -1- until the hub can be locked with the locating pin.



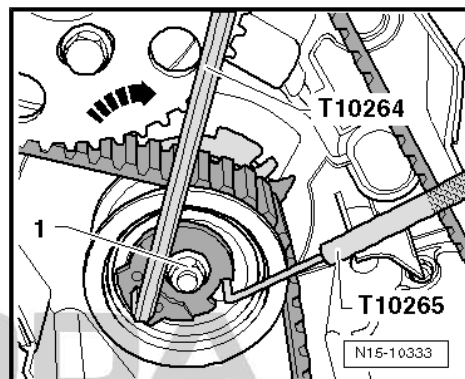
- Turn the timing belt gear - camshaft -3- and the timing belt gear - high pressure pump -5- clockwise in their elongated holes as far as the stop.

- Fit the timing belt in the following order.

- 1 - Toothed belt sprocket - crankshaft
- 2 - Tensioning pulley
- 3 - Timing belt gear - camshaft
- 4 - Timing belt gear - coolant pump
- 5 - Timing belt gear - high pressure pump
- 6 - Guide pulley

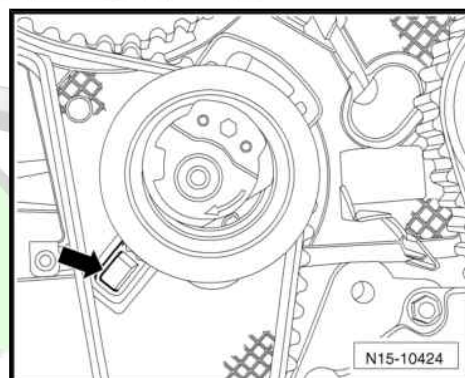


- Loosen nut -1- for tensioning pulley and remove rig tool - T10265- .



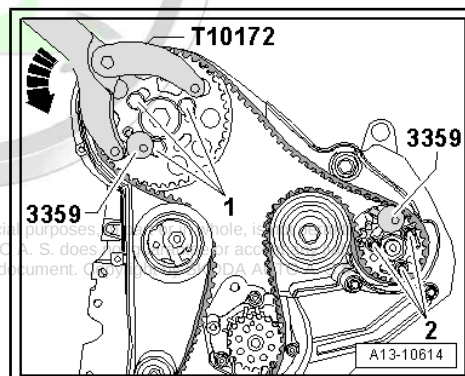
Note

Pay attention to the correct position of the tensioning pulley in the rear timing belt guard -arrow-.

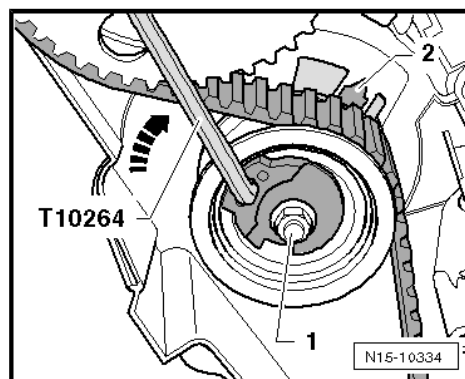


- Fit counterholder -T10172- with adapter -T10172/4 - onto camshaft sprocket.
- Push the counterholder in -direction of arrow- and keep it pre-tensioned.
- In this position, first of all tighten the screws -1- for timing belt gear - camshaft and the screws -2- for timing belt gear - high pressure pump to 20 Nm.

The screws must be further turned according to the setting of the timing ➔ [page 46](#) .



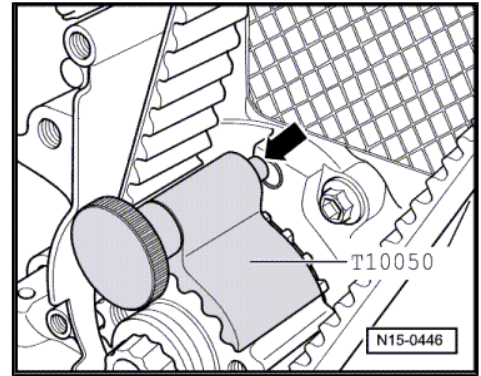
- Turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- clockwise -arrow- in such a way until the pointer -2- stands in the centre of the base plate in the gap.
 - The nut -1- must not turn along.
 - Hold tensioning pulley in this position and tighten nut.
- Tightening torque: 20 Nm + torque a further 45° (1/8 turn)
- Remove locking pins -3359- and crankshaft arrester - T10050- .



Test timing:

- Turn the crankshaft at the screw for timing belt gear 2 turns in the direction of running of the engine until the crankshaft is positioned shortly before "TDC".

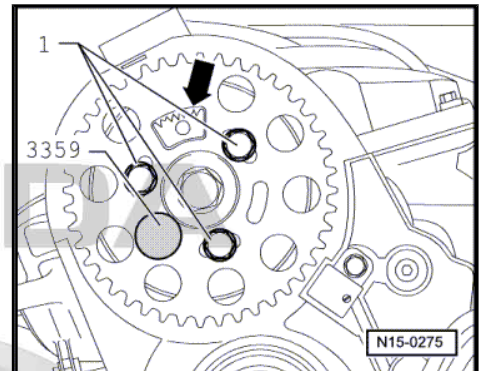
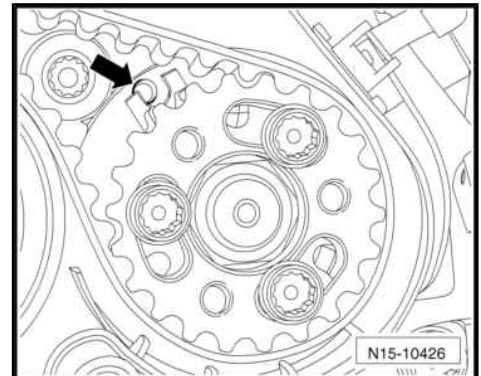
- Position again the crankshaft arrester -T10050- on the timing belt gear - crankshaft.
- Turn the crankshaft in the direction of running of the engine until the stud -arrow- of the crankshaft arrester engages during this rotary movement in the sealing flange.



Note

The removal of the crankshaft and camshaft is limited in the following test. The removal point of the hub of the high pressure pump is always difficult to find again. A slight difference -arrow- does not influence the engine running.

Conditions:



- The hub of the camshaft must be locked with the rig pin -3359- .
- The pointer of the tensioning pulley -2- must be in the area -a- of the base plate -1-.

If the conditions are not fulfilled:

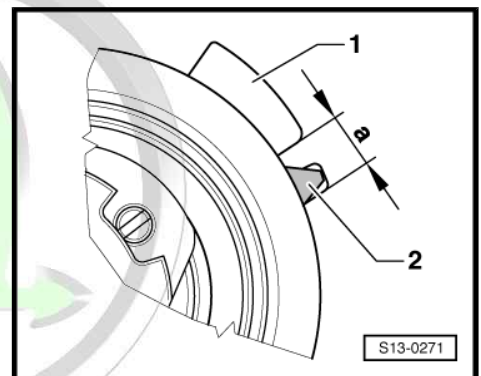
- Correct timing ⇒ [page 45](#) .

If the conditions are fulfilled:

- Continued if the timing is correctly set ⇒ [page 46](#) .

Correct timing:

- If the hub of the camshaft cannot be locked, pull back the crankshaft arrester -T10050- until the hole of the stud is uncovered.
- Turn the crankshaft against the running direction of the engine slightly over the “TDC”.
- Now turn the crankshaft slowly in the running direction of the engine until the hub of the camshaft can be locked.
- After locking, loosen the screws for timing belt gear - camshaft.



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If the stud of the crankshaft arrester -T10050- is positioned to the left of the hole:

- Turn the crankshaft in the direction of running of the engine until the stud of the crankshaft arrester engages during this rotary movement in the sealing flange.
- Tighten screws for timing belt gear - camshaft to 20 Nm.

If the stud of the crankshaft arrester -T10050- is positioned to the left of the hole:

- First of all turn the crankshaft slightly against the running direction of the engine.
- Turn the crankshaft again in the direction of running of the engine until the stud of the crankshaft arrester engages during this rotary movement in the sealing flange.
- Tighten screws for timing belt gear - camshaft to 20 Nm.

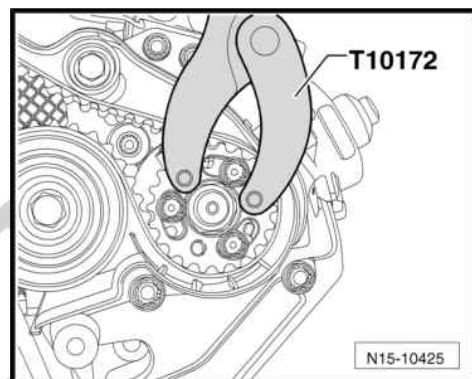
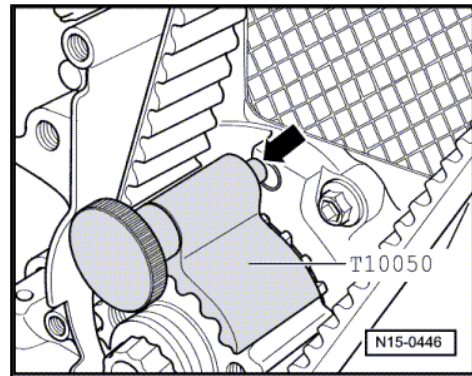
Continued if the timing is correctly set:

- Remove rig pin -3359- and crankshaft arrester -T10050- .
- Check the timing once again ⇒ [page 44](#) .
- If the hub of the camshaft can now be removed, tighten the fixing screws as follows:
- ◆ Timing belt gear - camshaft: Torque screws a further 45° (1/8 turn). Counterhold with counterholder -T10172- and adapters -T10172/4- .
- ◆ Timing belt gear - high pressure pump: Torque screws a further 90° (1/4 turn). Counterhold with counterholder -T10172- and adapters -T10172/8- .

Further installation:

Further installation occurs in reverse order to removal.

- ◆ Tightening torques: ⇒ [page 35](#)



2 Removing and installing sealing flange and flywheel



Note

Repairs to the clutch ⇒ Gearbox; Rep. Gr. 30.

1 - Sealing ring

- ☐ replace ⇒ [page 48](#)
- ☐ do not oil or grease

2 - Sealing flange -on the belt pulley side-

- ☐ must be positioned on dowel sleeves
- ☐ removing and installing ⇒ [page 49](#)

3 - Cylinder block

4 - The two-mass flywheel

- ☐ removing and installing ⇒ [page 57](#)
- ☐ Assembly is only possible in one position through offset holes.

5 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Intermediate plate

- ☐ must be positioned on dowel sleeves
- ☐ do not damage/bend during assembly work
- ☐ hang on the sealing flange ⇒ [page 48](#)

7 - 15 Nm

- ☐ replace

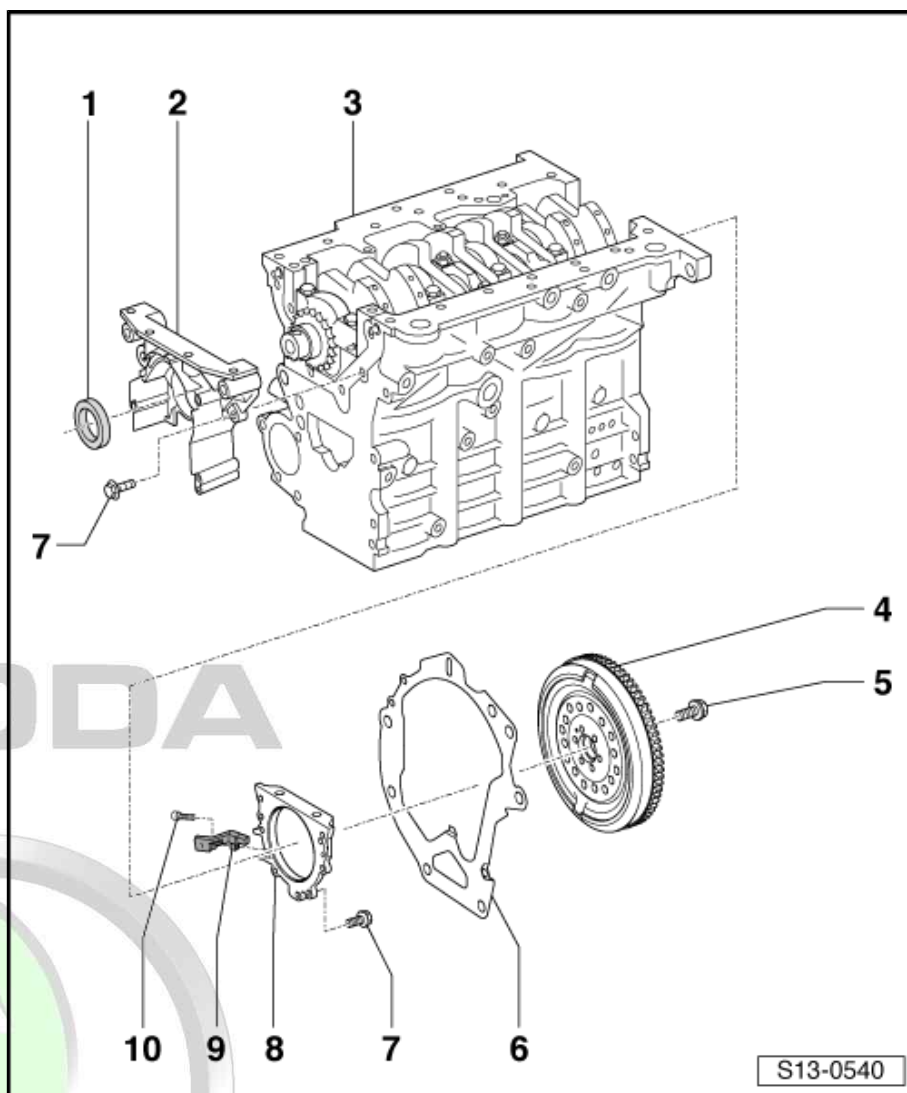
8 - Sealing flange -on the gear-box side-

- ☐ can only be replaced complete with gasket ring and with rotor of engine speed sender -G28-
- ☐ replace ⇒ [page 51](#)

9 - Engine speed sender -G28-

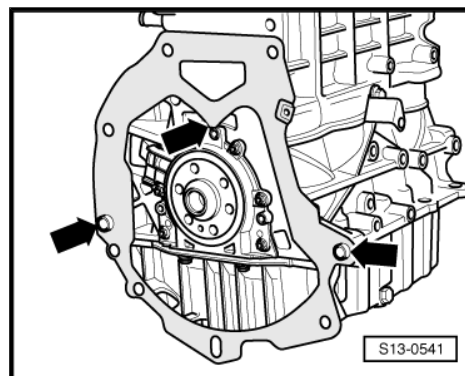
- ☐ removing and installing ⇒ [page 174](#)

10 - 5 Nm



Installing intermediate plate

- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



2.1 Replacing gasket ring for crankshaft - on the belt pulley side

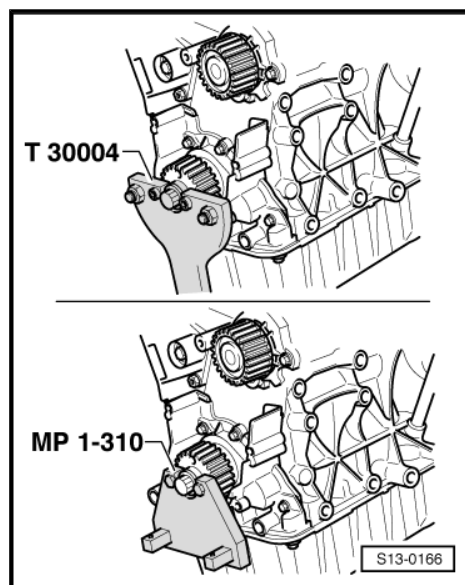
Special tools and workshop equipment required

- ◆ Counterholder -T30004 (3415)- or Counterholder -MP 1-310 (3099)-
- ◆ Gasket ring extractor -MP 1-226 (3203)-
- ◆ Assembly device -T10053-

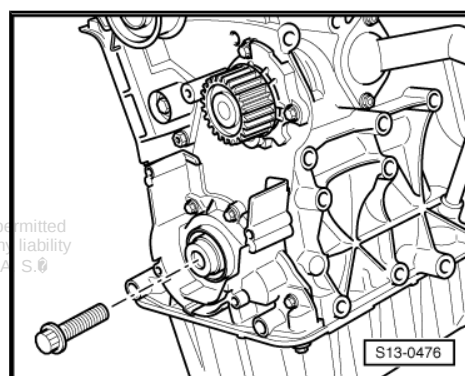
Removing

- Engine installed.
- Removing toothed belt ➔ [page 37](#) .
- Remove crankshaft - toothed belt sprocket, to this end lock toothed belt sprocket with counterholder -T30004- or counterholder for toothed belt sprocket -MP 1-310- .

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- To guide the gasket ring extractor screw in central screw for toothed belt sprocket - crankshaft in the crankshaft up to the stop.



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- Turn inner part of gasket ring extractor -MP 1-226- two turns (approx. 3 mm) out of the outer part and lock with knurled screw.
- Oil the thread head of the gasket ring extractor, position and forcibly screw into the gasket ring as far as possible.
- Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surface.

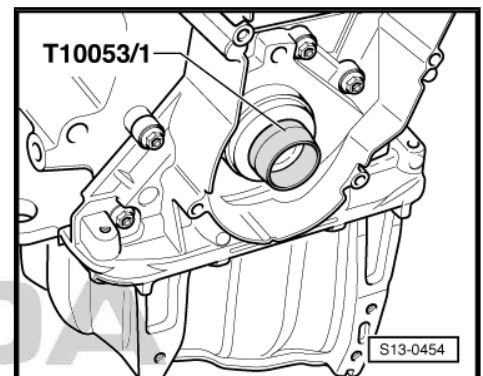
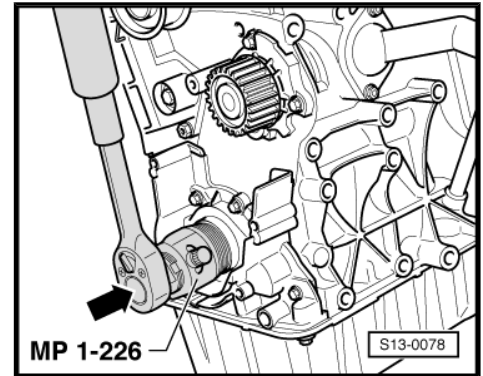
Install



Note

Do not oil the sealing lip and the outer surface of the gasket before the pressing in procedure.

- Remove oil residue on the crankshaft journal with a clean cloth.
- Insert guide bushing -T10053/1- on the crankshaft journal.
- Slide gasket ring over the guide bushing.

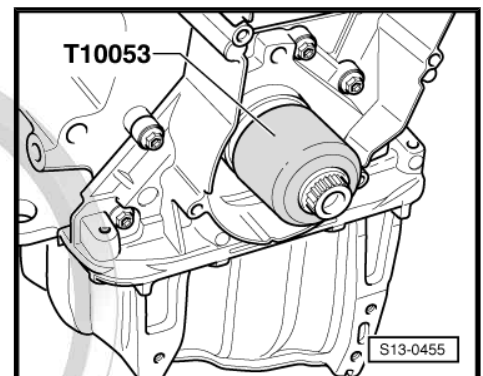


- Press in the gasket ring flush with the central screw for the toothed belt sprocket of crankshaft and with the pressure bushing of the assembly device -T10053- .



Note

- ◆ *There must not be any oil present on contact surface between toothed belt sprocket and crankshaft.*
- ◆ *Replace central screw for crankshaft toothed belt sprocket.*
- ◆ *Do not oil central screw for toothed belt sprocket of crankshaft.*
- Install toothed belt sprocket - crankshaft, to this end lock toothed belt sprocket with counterholder .
- Installing the timing belt ⇒ [page 42](#) .



2.2 Removing and installing the sealing flange -on the belt pulley side

Special tools and workshop equipment required

- ◆ Counterholder -T30004 (3415)- or Counterholder -MP 1-310 (3099)-
- ◆ Assembly device -T10053-



- ◆ Torque wrench
- ◆ Protective goggles and gloves
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Silicone sealant -D 176 404 A2-

Removing

- Engine installed.
- Removing toothed belt ⇒ [page 37](#) .
- Remove crankshaft - toothed belt sprocket, to this end lock toothed belt sprocket with counterholder -T30004 - or counterholder for toothed belt sprocket -MP 1-310 - .
- Drain engine oil ⇒ Maintenance ; Octavia II .
- Removing the oil pan ⇒ [page 100](#) .
- Unscrew the fixing screws of the front sealing flange and remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.
- Drive out the gasket ring from the removed sealing flange.

Install

Installation is performed in the reverse order, pay attention to the following points:



WARNING

Wear protective gloves when working with sealant and grease remover!

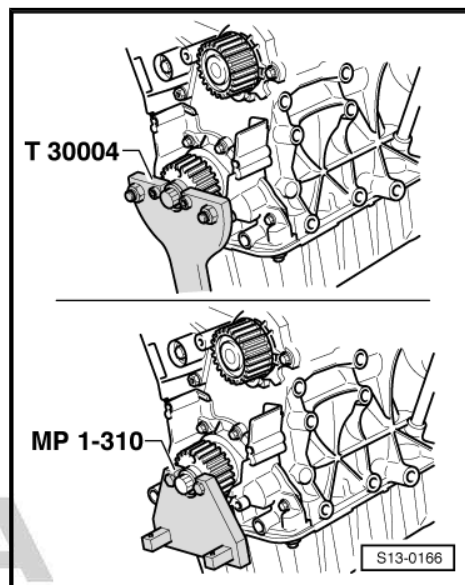
- Remove residual sealant from the sealing surfaces on sealing flange, cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.



Note

Pay attention to the use by date on the silicone sealant.

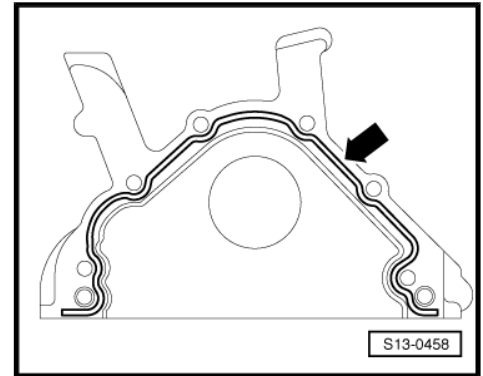
- Cut off nozzle tube at the front marking (Ø of nozzle approx. 3 mm).



- Apply silicone sealant bead -arrow- to the clean sealing surface of the sealing flange, as shown.
- Thickness of sealant bead -arrow-: 2...3 mm.

i Note

- ◆ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clogg the strainer in the oil suction pipe.*
- ◆ *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *When installing the sealing flange with the gasket ring fitted place a guide sleeve -T10053/1- on the crankshaft journal.*



- Carefully push the sealing flange onto the dowel sleeves at the cylinder block and tighten new fixing bolts by hand.
- Tighten the screws of the sealing flange alternately and cross-wise to 15 Nm.
- Installing the oil pan ➔ [page 100](#) .
- Install the new gasket ring for the crankshaft - on the belt pulley side ➔ [page 48](#) .
- Installing the timing belt ➔ [page 42](#) .
- Top up with engine oil and check the oil level ➔ Maintenance ; Octavia II .

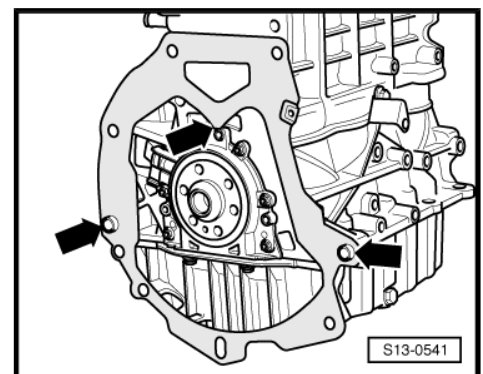
2.3 Replace sealing flange -on the gearbox side-

Special tools and workshop equipment required

- ◆ Assembly device -T10134-
- ◆ Torque wrench
- ◆ Feeler gauges
- ◆ Steel straightedge
- ◆ Screw M6x35 (3x)
- ◆ Screw M7x35 (2x)

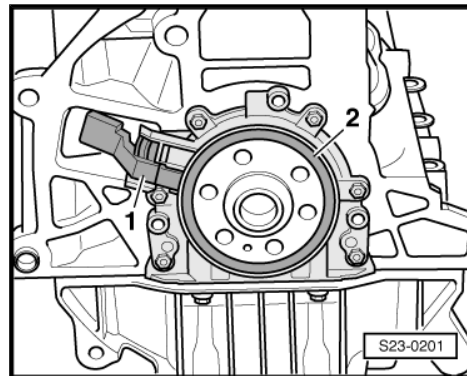
2.3.1 Removing

- Gearbox removed.
- Remove the two-mass flywheel ➔ [page 57](#) .
- Remove the intermediate plate from the dowel sleeves and unhook from sealing flange -arrows-.
- Position crankshaft to TDC for cylinder 1 ➔ [page 37](#) .
- Removing the oil pan ➔ [page 100](#) .

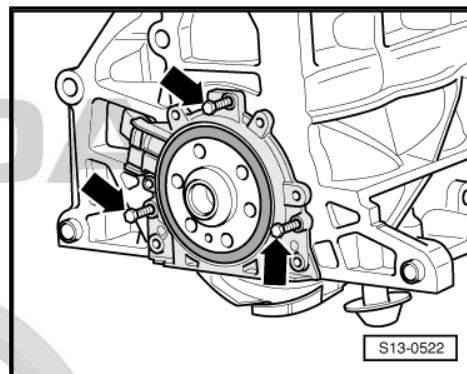




- Remove engine speed sender -G28- -Pos. 1-.
- Unscrew the fixing screws of the sealing flange.



- Screw 3 screws M6x35 into the threaded bores of the sealing flange -arrows-.
- Press out sealing flange together with rotor from the crankshaft by alternately screwing the screws into the sealing flange.



2.3.2 Install

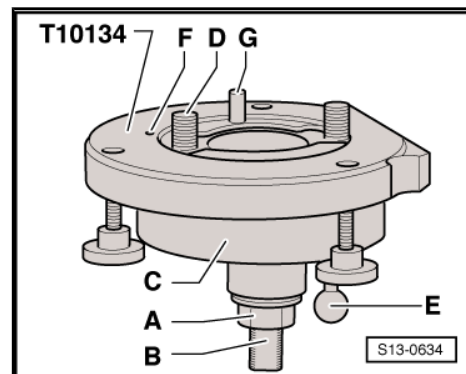


Note

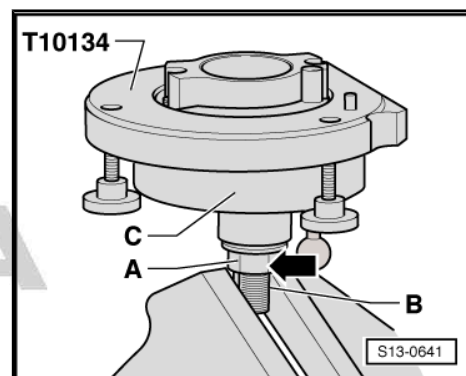
- ◆ *The sealing flange with PTFE gasket ring is provided with sealing lip supporting ring. This supporting ring is intended as an assembly sleeve and must not be removed before installing.*
- ◆ *Do not separate or turn the sealing flange and rotor after removing them from the spare part package.*
- ◆ *The rotor is given its fitting location by fixing the assembly device -T10134- to the positioning pin.*
- ◆ *The sealing flange and gasket ring form one unit and must be replaced together with the rotor.*
- ◆ *The rotor has an elastomer layer on its sealing surface with the crankshaft. This layer must not be brought into contact with dirt or grease.*
- ◆ *The assembly device -T10134- is given its fitting location to the crankshaft by means of a guide bolt, which is guided into the threaded bore of the crankshaft.*

A - Mounting sealing flange with rotor on the assembly device - T10134-

- A - Hexagon nut
- B - Clamping surface
- C - Assembly cup
- D - Allan screw
- E - Guide bolts (with red handle - for fuel engine)
- F - Positioning pin
- G - Guide bolts (with black handle - for diesel engine)



- Grip assembly device assembly device -T10134- on clamping surface -B- of the threaded spindle in a vice.
- Push assembly cup -C- down so that it rests on the hexagon nut -A- -arrow-.
- The inner part of the assembly device and assembly cup must be at the same level.

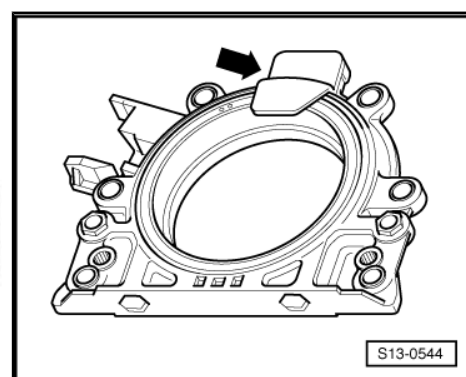


- Remove the securing clip -arrow- from the new sealing flange.



Note

Do not remove or turn the rotor from the sealing flange.

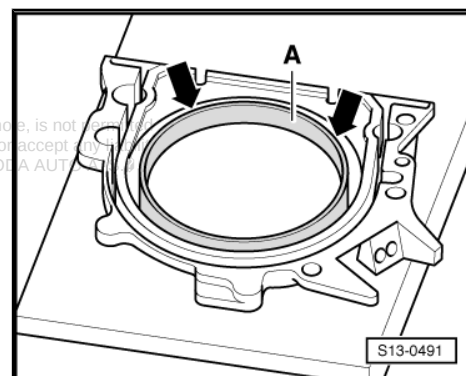


- Lay the front side of the sealing flange on a clean and level surface.
- Press the sealing lip supporting ring -A- -arrows-, until it rests on the level surface.

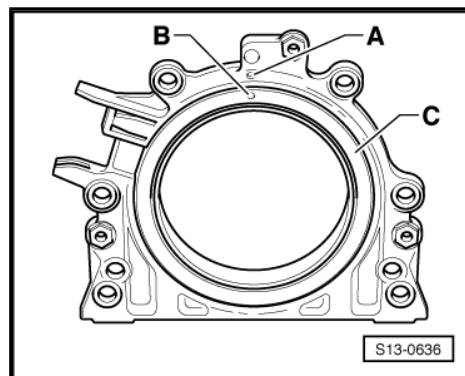


Note

The top side of the rotor and the front side of the sealing flange must be flush.



The locating hole -B- on the rotor -C- must be flush with the marking -A- on the sealing flange.

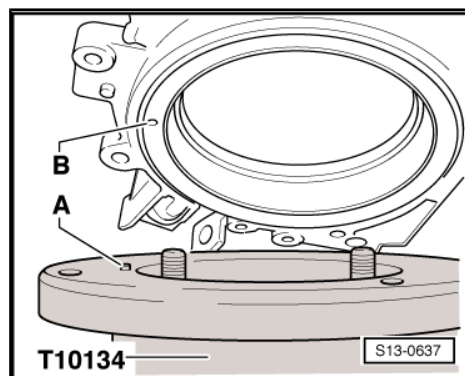


- Lay the sealing flange with the front side on the assembly device -T10134- in such a way that the positioning pin -A- engages in the hole -B- of the rotor.



Note

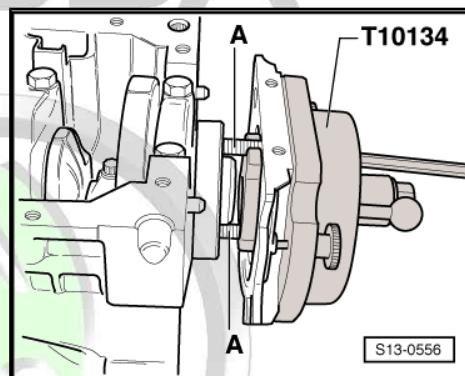
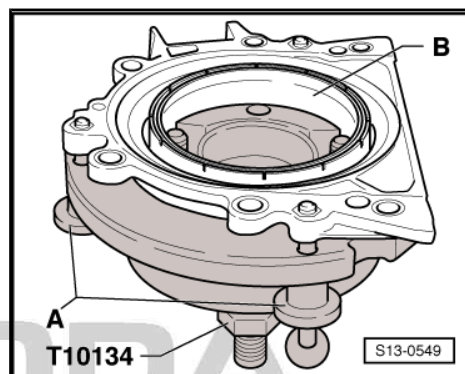
Make sure the sealing flange lies flat on the assembly device.



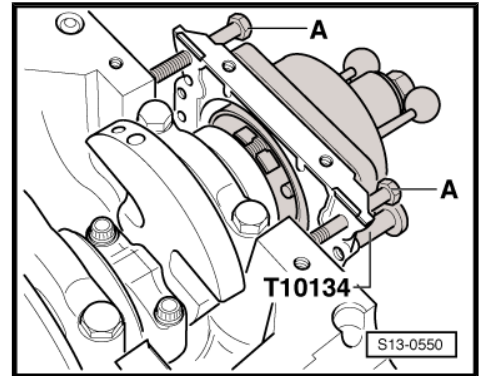
- When tightening the knurled screws -A- press the sealing lip supporting ring -B- on the surface of the assembly device -T10134- in such a way that the positioning pin can no longer slide out of the rotor hole.

B - Mounting the assembly device -T10134- with sealing flange on the crankshaft flange

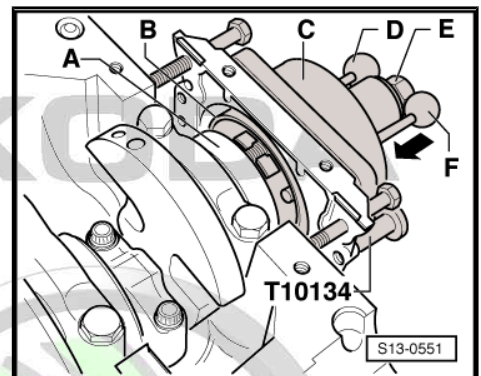
- The crankshaft flange must be free of grease and oil
- Crankshaft is at TDC for cylinder 1
- Unscrew hexagon nut up to the end of the threaded spindle.
- Screw assembly device -T10134- with Allan screws -A- up to the stop onto the crankshaft flange.



- Screw in two M7x35 mm screws -A- by about 3 turns for sealing flange guide into the cylinder block.



- Move the assembly cup -C- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -A-. Subsequently insert the guide bolt with black handle -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-. This gives the rotor its final fitting location.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup -C-.



Note

The guide bolt for petrol engines (red handle) -F- must not be fitted into the threaded hole of the crankshaft.

C - Pressing the rotor onto the crankshaft flange

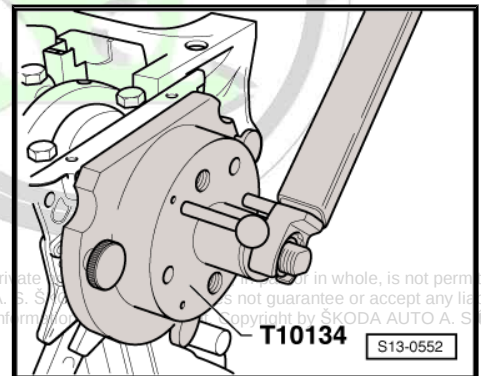
- Tighten the hexagon nut of the assembly device -T10134- using a torque wrench with adapter. Tightening torque: 35 Nm.



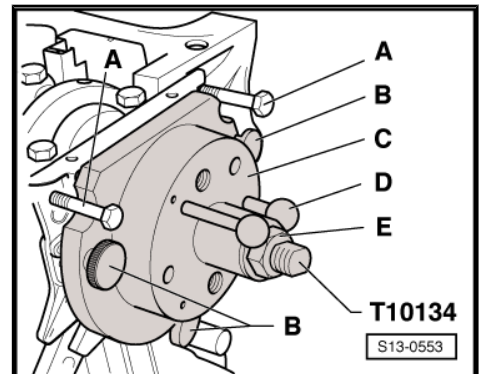
Note

After tightening the nut to 35 mm there must still be a narrow air gap between the cylinder block and the sealing flange.

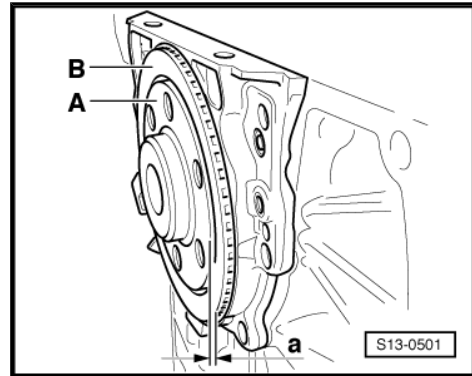
D - Inspecting the fitting position of the rotor on the crankshaft



- Unscrew hexagon nut -E- up to the end of the threaded spindle.
- Release both screws -A- to the guide from the cylinder block.
- Release three knurled screws -B- from the sealing flange.
- Unscrew two Allan screws and remove assembly device.
- Remove sealing lips supporting ring.



The fitting position of the rotor on the crankshaft is accurate if there is a distance -a- of 0.5 mm between the crankshaft flange -A- and the rotor -B-.



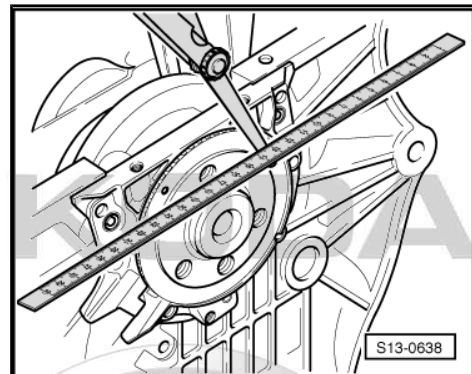
- Position the steel straightedge onto the crankshaft flange.
- Measure the distance between the steel straightedge and the rotor with a feeler gauge.

If the measured distance is less than 0.5 mm:

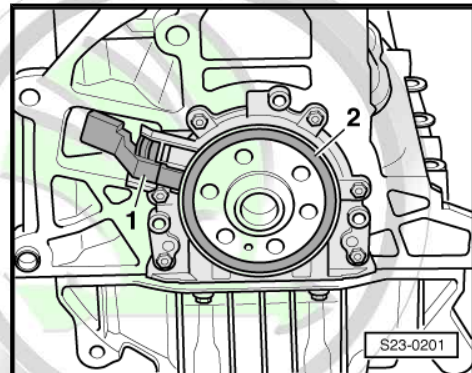
- Press down rotor ➔ [page 56](#) .

If the dimension is correct:

- Tighten the new fixing screws of the sealing alternately cross-wise. Tightening torque: 15 Nm.

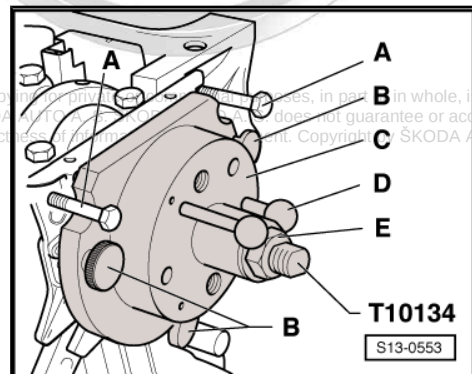


- Install engine speed sender -G28- -Pos. 1-. Tightening torque: 5 Nm.
- Installing the oil pan ➔ [page 100](#) .
- Fit intermediate plate.
- Install flywheel with new screws. Tighten fixing bolts to 60 Nm and torque a further 1/4 turn (90°).



E - Pressing down the rotor

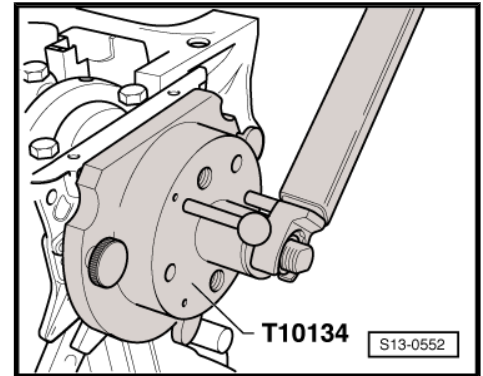
- Screw assembly device -T 10134- with Allan screws up to the stop onto the crankshaft flange.
- Screw in three knurled screws -B- into the flange.
- Subsequently insert the guide bolt with black handle -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup.



- Tighten the hexagon nut of the assembly device using a torque wrench with adapter. Tightening torque: 40 Nm.
- Again inspect the fitting position of the rotor on the crankshaft
⇒ [page 55](#).

If the dimension -a- is again too small:

- Tighten the hexagon nut of the assembly device to 45 Nm.
- Again inspect the fitting position of the rotor on the crankshaft
⇒ [page 55](#).



2.4 Removing and installing the two-mass flywheel

- ◆ Engine mount -MP 1-202 (VW 540)-
- ◆ Bushing -T30010 (VW 540/1B)-
- ◆ Flywheel lock -MP 1-504-
- ◆ Flywheel lock -MP1-223 (3067)-

Removing

- Gearbox removed.

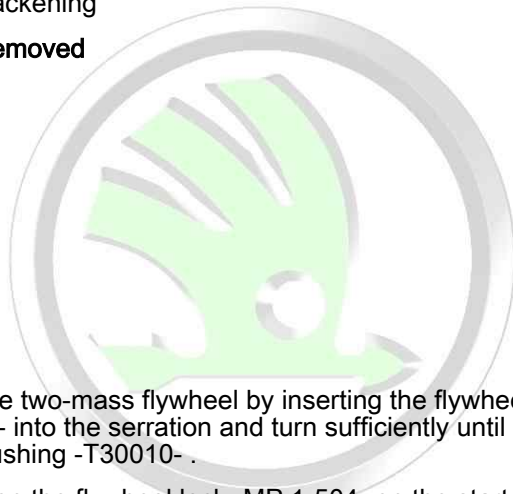
Engine installed

- Insert the counterholder -MP1-223 (3067)- into the bore hole on the cylinder block.
- Fitting position of the counterholder:

A - for tightening

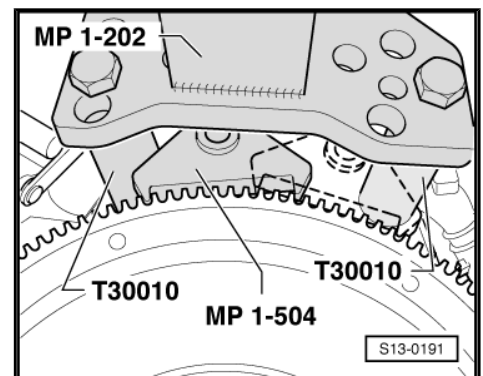
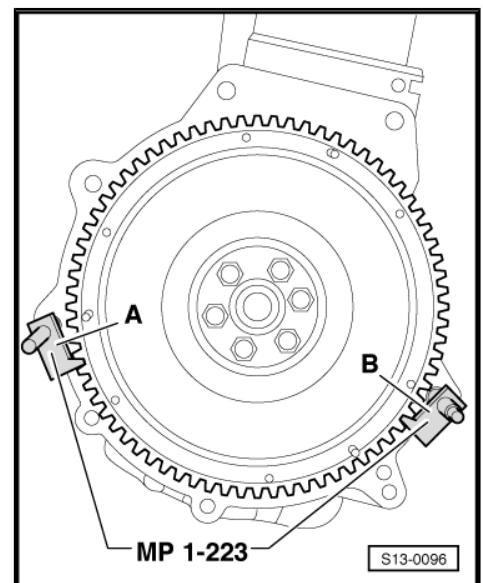
B - for slackening

Engine removed



- Secure two-mass flywheel by inserting the flywheel lock -MP 1-504- into the serration and turn sufficiently until it touches the bushing -T30010-.
- Position the flywheel lock -MP 1-504- on the starter ring gear and turn crankshaft until it rests against the sleeve -T30010-.

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Continued for all engines

- Rotate two-mass flywheel -A- in such a way that the screws are positioned in the middle of the holes -arrows-.



Caution

When unscrewing the screws -B-, ensure that no screw head catches on the secondary side -A- of the two-mass flywheel, otherwise it will be damaged.

- Release screws -B- and remove two-mass flywheel.

Install

Installation is performed in the reverse order, pay attention to the following points:

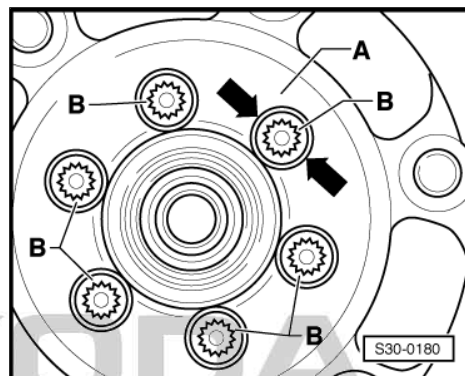
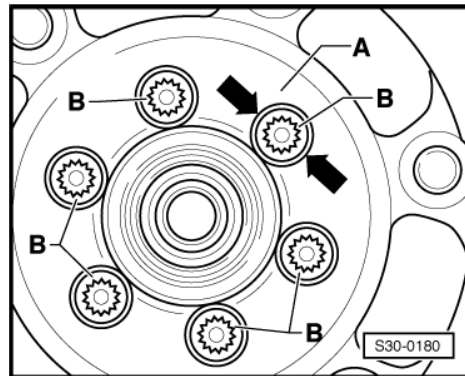


Note

Use new screws for attaching.

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.

1. Screw in all the screws -B- by hand.
2. First of all tighten all the screws -B- crosswise to 60 Nm.
3. Then torque all the screws -B- crosswise a further 90° (1/4 turn.)



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3 Crankshaft, Piston and Conrod

3.1 Removing and installing crankshaft



The engine should be attached to the engine repair stand with the engine holder -MP 1-202- for carrying out removal and installation work.

1 - Bearing shell

- ☐ for cylinder block with lubricating groove
- ☐ for bearing cap without lubricating groove
- ☐ do not mix up already used bearing shells (mark)

2 - Drive chain sprocket

- ☐ for oil pump
- ☐ removing and installing
⇒ [page 66](#)

3 - Bearing shell

- ☐ for cylinder block with lubricating groove
- ☐ for bearing cap without lubricating groove
- ☐ do not mix up already used bearing shells (mark)

4 - Thrust washers

- ☐ for bearing cap 3
- ☐ pay attention to locating element

5 - 65 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Bearing caps

- ☐ Bearing cap 1: belt pulley side
- ☐ Bearing cap 3: with recesses for thrust washers

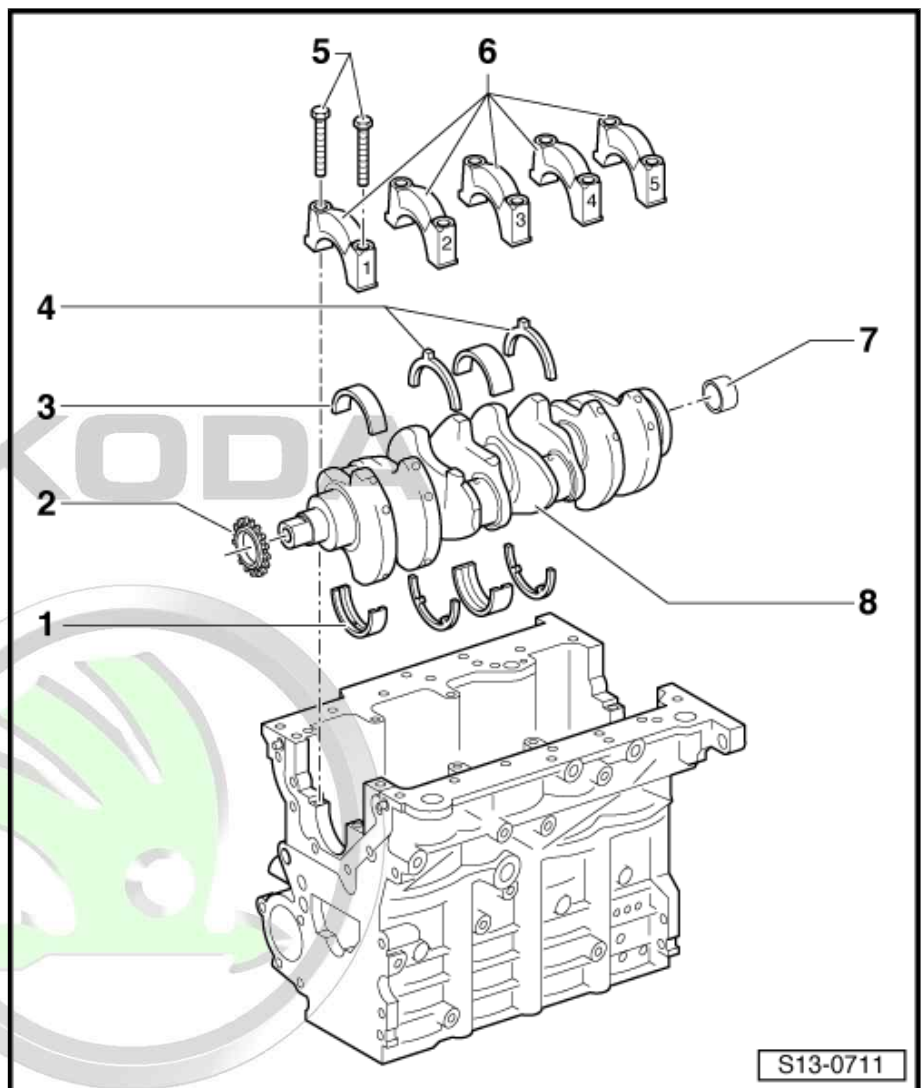
- ☐ retaining lugs of the bearing shells of the cylinder block/bearing cap must be on top of one another

7 - Needle bearing

- ☐ only vehicles with automatic gearbox
- ☐ replace ⇒ [page 60](#)

8 - Crankshaft

- ☐ with chain sprocket for oil pump drive
- ☐ Axial play when new: 0.07...0.17 mm
- Wear limit: 0.37 mm



S13-0711

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- ❑ Crankshaft bearing: $\varnothing$ 54.00 mm
- ❑ Conrod bearing: $\varnothing$ 50.90 mm

3.2 Replace needle bearing for crankshaft

Only on vehicles fitted with automatic gearbox 02E.

Special tools and workshop equipment required

- ◆ Centering mandrel -T30029 (3176)-
- ◆ Interior extractor -Kukko 21/2-
- ◆ Countersupport for needle bearing extractor - Kukko 22/1-



Note

For installing an engine in a vehicle with automatic gearbox 02E, check whether the needle bearing is built on the gearbox side in the crankshaft. Install the needle bearing as required.

Removing

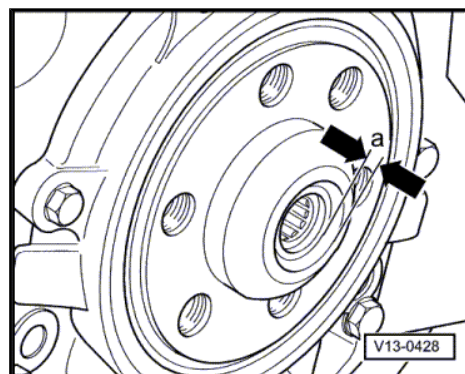
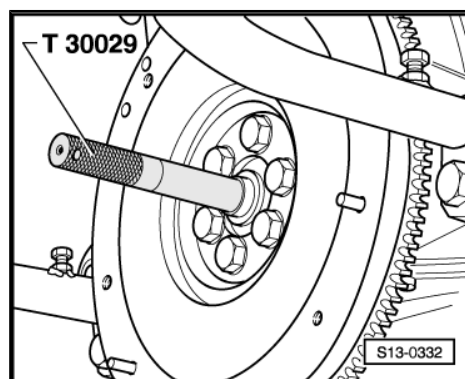
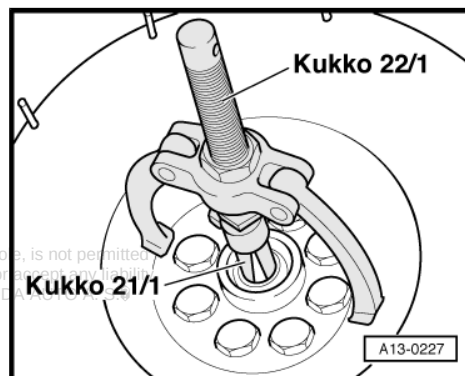
- Remove the needle bearing using the interior extractor -Kukko 21/2- and the countersupport for needle bearing extractor - Kukko 22/1- .

Install

- Drive in the needle bearing using the centering pin -T30029- .
- Fitting position: The marked side of the needle bearing should be legible when in its installed condition.

Depth of installation of the needle bearing

- Dimension -a-: 1.5 up to 1.8 mm



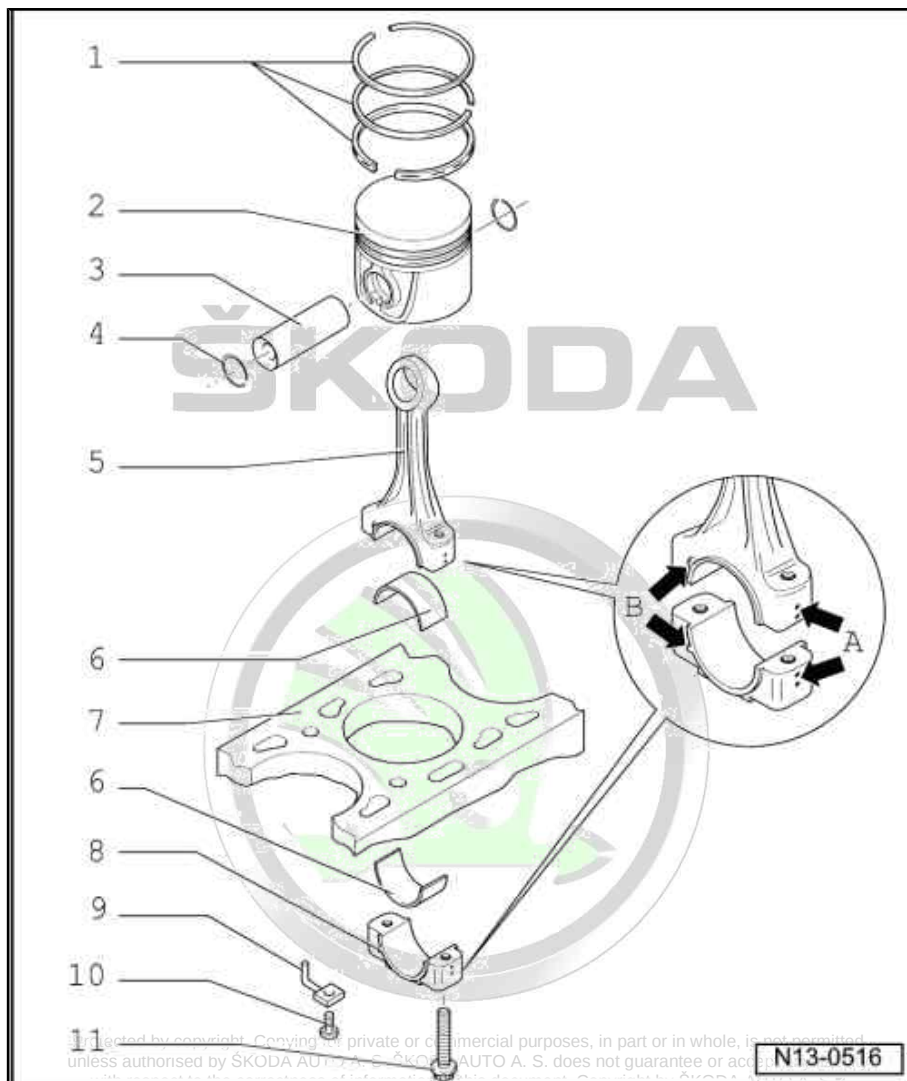
3.3 Disassembling and assembling pistons and conrods

1 - Piston rings

- ☐ Offset joint 120°
- ☐ use piston ring pliers for removing and installing
- ☐ marking "TOP" faces piston crown
- ☐ Inspect gap clearance
⇒ [page 62](#)
- ☐ Inspect end clearance
⇒ [page 63](#)

2 - Piston

- ☐ with combustion chamber
- ☐ mark installation position and matching cylinder
- ☐ Installation position and assignment of piston/cylinder ⇒ [page 63](#)
- ☐ arrow on piston crown faces towards the belt pulley side
- ☐ replace piston if there is any sign of crack formation on the piston body
- ☐ Inspecting piston
⇒ [page 63](#)
- ☐ Piston dimension: Ø 80.96 mm
- ☐ use piston ring tensioning strap for installing
- ☐ inspect piston projection at TDC ⇒ [page 64](#)



3 - Piston pin

- ☐ if stiff, heat piston to approx. 60°C
- ☐ use drift -VW 222A- for removing and installing

4 - Circlip

- ☐ replace

5 - Conrod

- ☐ always replace as a set only
- ☐ mark matching cylinder -A-
- ☐ Fitting position: Markings -B- point towards the belt pulley side
- ☐ with a split bearing cap
- ☐ separate new conrod ⇒ [page 65](#)

6 - Bearing shell

- ☐ Fitting position ⇒ [page 64](#)
- ☐ do not mix up already used bearing shells (mark)
- ☐ Observe version: top bearing shell (towards the piston) must be made from a long lasting material, recognition feature for new bearing shells: black marking on the contact surface near the separation point
- ☐ insert in middle ⇒ [page 64](#)
- ☐ pay attention to correct position



- ☐ Axial play wear limit: 0.37 mm

7 - Cylinder block

- ☐ Inspect cylinder ⇒ [page 64](#)
- ☐ Cylinder dimension: Ø 81.01 mm

8 - Conrod bearing cap

- ☐ Check fitting position
- ☐ cracked cover fits only in one position at the relevant conrod

9 - Oil injection nozzle

- ☐ for piston cooling
- ☐ removing and installing ⇒ [page 64](#)

10 - 25 Nm

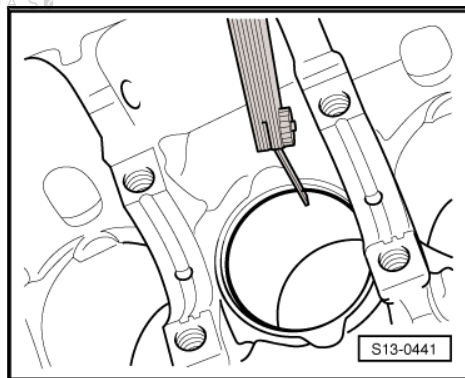
- ☐ replace without sealant
- ☐ removing and installing ⇒ [page 64](#)

11 - 30 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ Oil thread and contact surface

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Inspecting piston ring gap clearance

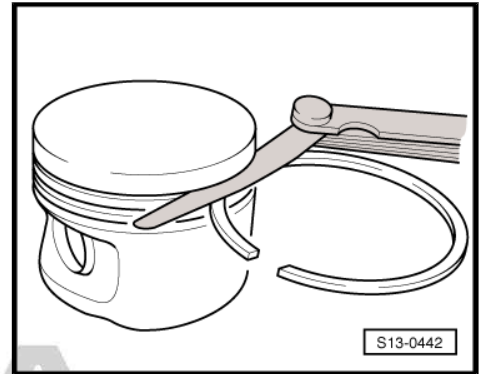


Special tools and workshop equipment required

- ◆ Feeler gauges
- Insert ring at right angles from above down into lower cylinder opening, about 15 mm away from edge of cylinder. To insert use piston without rings.

Piston ring (dimensions in mm)	new	Wear limit
1. Compression ring	0,20...0,40	1,00
2. Compression ring	0,20...0,40	1,00
Oil scraper ring	0,25...0,50	1,00

Inspect piston ring end clearance

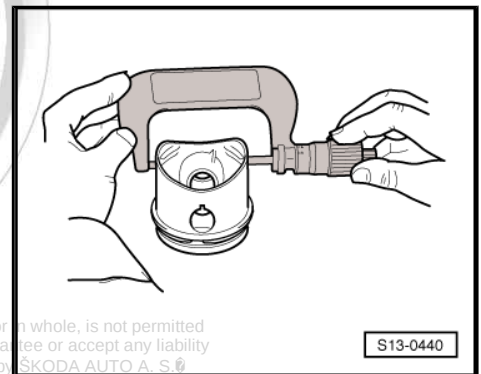


Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean before inspecting the annular grooves of the piston.

Piston ring (dimensions in mm)	new	Wear limit
1. Compression ring	0,06...0,09	0,25
2. Compression ring	0,05...0,08	0,25
Oil scraper ring	0,03...0,06	0,15

Inspecting pistons



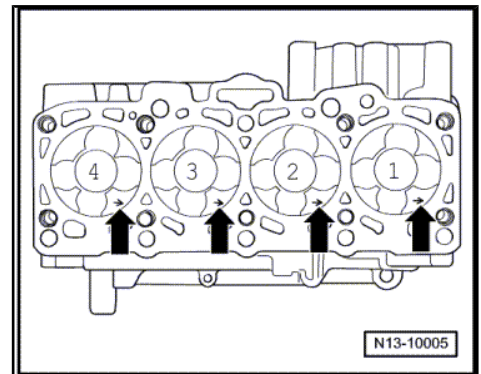
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Special tools and workshop equipment required

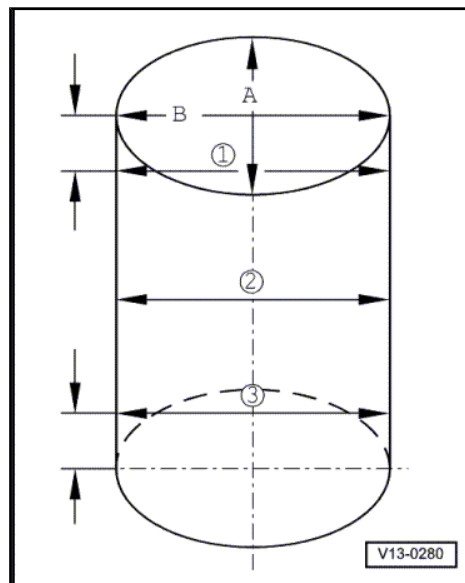
- ◆ External micrometer
- Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.
- Max. deviation from specified dimension: 0.04 mm.

Installation position and assignment of piston/cylinder

- The arrow on the piston crown -arrows- faces towards the belt pulley side.



Inspecting cylinder bore

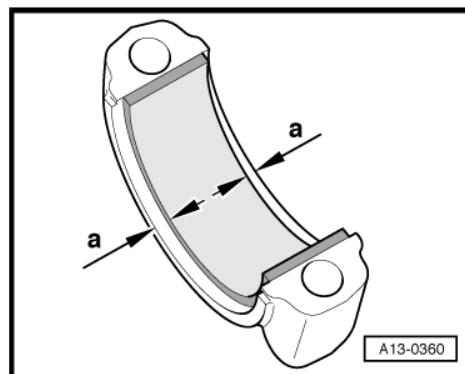


Special tools and workshop equipment required

- ◆ Internal precision measuring instrument
- Measure cylinder at 3 points crosswise in transverse direction -A- and lengthwise -B-.
- Max. deviation from specified dimension: 0.10 mm.

Fitting position of the bearing shells in the conrods

- Insert bearing shell in the conrod or in the conrod bearing cap centred.
- Dimension -a- = 2.5 mm



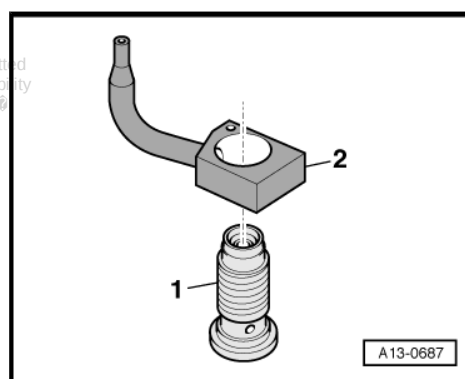
Oil spray nozzle and pressure relief valve

- 1 - Screw with pressure relief valve
 - 2 - Oil spray nozzle (for cooling piston)
- Fitting position: Align the guide edge of the oil injection nozzle to the area of the cylinder block being worked on.



Note

- ◆ The oil injection nozzles must not be bent.
- ◆ Replace the oil injection nozzles if they are bent.



3.4 Checking piston projection in TDC

Special tools and workshop equipment required

- ◆ Measuring tool for liner pretension -MP 1-107-

Test sequence

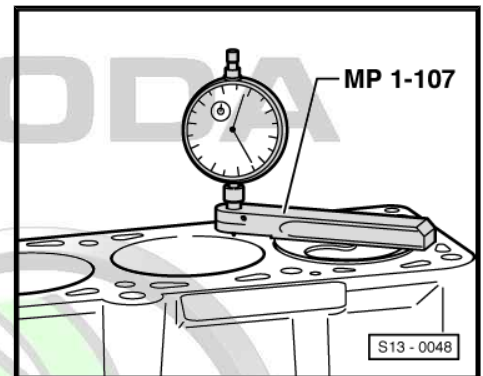
- Attach the measuring tool for piston projection - MP 1-107- to the cylinder block as shown in the illustration.
- Measure the projection for each piston at 2 points.

When fitting new pistons or a partial engine, check the piston projection in TDC on all pistons.

If different values are measured during the projection measurement of the piston, the highest value applies for the seal assignment.

Depending on the piston projection fit the relevant cylinder head seal in accordance with the table below.

Piston projection over cylinder block - top side mm	Bore marking
0,91...1,00	1
1,01...1,10	2
1,11...1,20	3



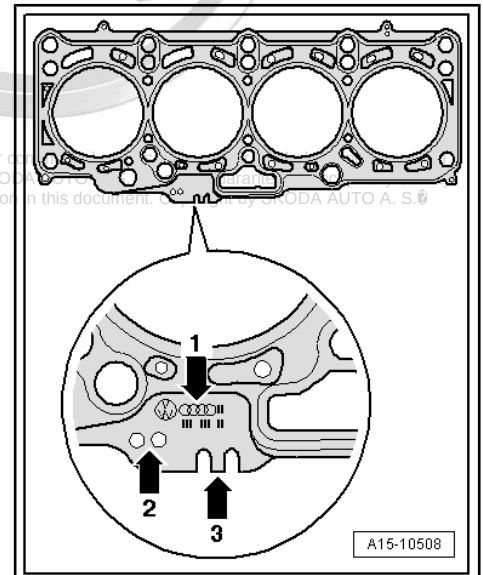
Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Bores = -arrow 2-
- ◆ Holes = -arrow 3- (ignore)



Note

If different values are measured during the projection measurement of the piston, the greatest dimension applies for the seal assignment.



3.5 Separating new conrod

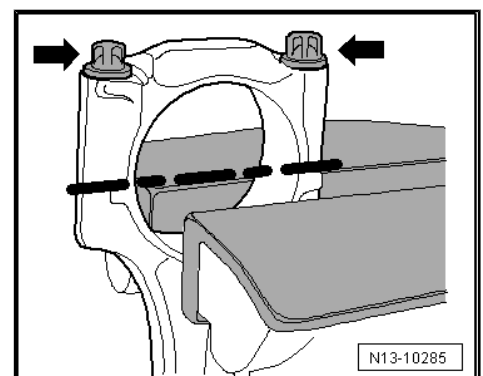
It can happen that the predetermined breaking point on the new conrod is not completely pierced. If the conrod bearing cap cannot be lifted by hand, proceed in the following manner:

- Mark the assignment of the conrod to the cylinder.
- Slightly tension the conrod, as shown in the illustration, in a vice provided with aluminium protective jaws.

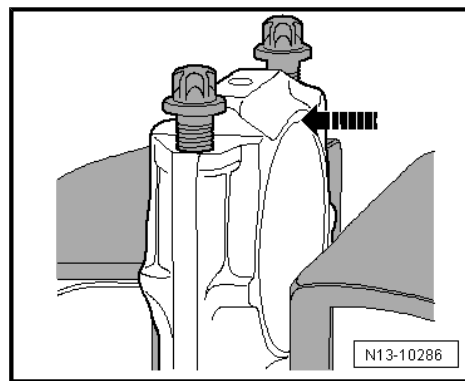


Note

- ◆ *The conrod must only be slightly tensioned in order to avoid damage on the conrod.*
- ◆ *The conrod is clamped below the broken line.*
- Unscrew both screws -arrows- by approx. 5 turns.



- Carefully knock with a plastic hammer in -direction of arrow - against the conrod bearing cap until it is loose.



3.6 Removing and installing drive chain sprocket

Special tools and workshop equipment required

- ◆ Bushing -MP1-316 (30 - 100)-
- ◆ Two-arm extractor, standard commercially available
- ◆ Protective gloves

Removing

- Remove sealing flange - on the belt pulley side ➔ [page 49](#) .
- Remove chain tensioner, chain sprocket for oil pump and oil pump chain.
- Remove drive chain sprocket of crankshaft with two-arm extractor -2-. At the same time protect the crankshaft journal with a suitable washer -1-.

Install

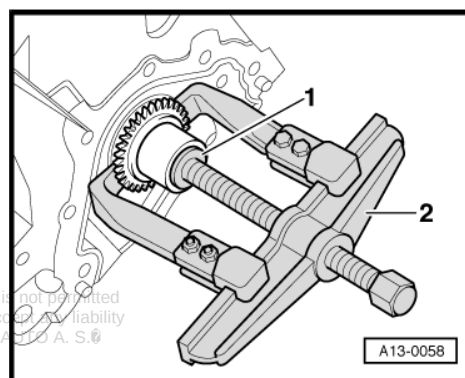
Installation is performed in the reverse order, pay attention to the following points:



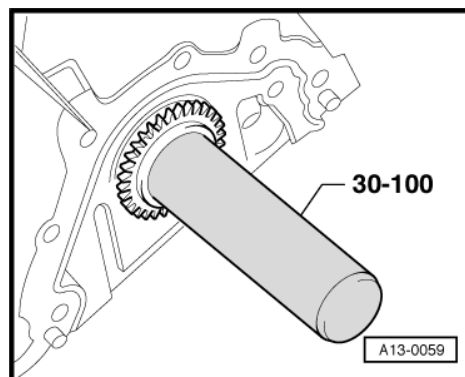
WARNING

Wear protective gloves!

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- Heat up the drive chain sprocket in an oven for about 15 minutes to 220 °C.
- Place the drive chain sprocket on the shaft end using pliers and with drive bushing -30 - 100- slide on until the stop on the crankshaft is reached.
- Fitting location: the broad collar of the drive chain sprocket (45° chamfer in the hole) points to the engine.



15 – Cylinder Head, Valve Gear

1 Removing and installing cylinder head



Note

- ◆ *Cylinder heads with cracks between the valve seats may continue to be used without any reduction in the life time provided the cracks are slight and max. 0.5 mm wide.*
- ◆ *It is not permissible to rework the cylinder heads of diesel engines.*
- ◆ *Replace O-rings and gaskets.*
- ◆ *Replace cylinder head bolts and screws which have been tightened to a torquing angle.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the head.*
- ◆ *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- ◆ *When replacing the cylinder head, replace all the coolant ⇒ [page 111](#).*
- ◆ *Change contaminated engine oil ⇒ Maintenance ; Octavia II.*

1.1 Cylinder head cover - Summary of components

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1 - 5 Nm

2 - High pressure reservoir (rail)

- ☐ with injection lines
- ☐ do not change the flexion of the injection lines
⇒ [page 176](#)

3 - 22 Nm

4 - Injection unit (Piezo injector)

- ☐ removing and installing
⇒ [page 178](#)

5 - 5 Nm

6 - Cover for injection unit

7 - Bush

- ☐ for attaching the high pressure reservoir
- ☐ replace if damaged

8 - 10 Nm

9 - Clamping claw

- ☐ pay attention to correct installation position
⇒ [page 178](#)

10 - Support

- ☐ for wiring loom

11 - Cylinder head cover

- ☐ removing and installing
⇒ [page 69](#)

12 - Gasket

- ☐ replace if damaged or leaking

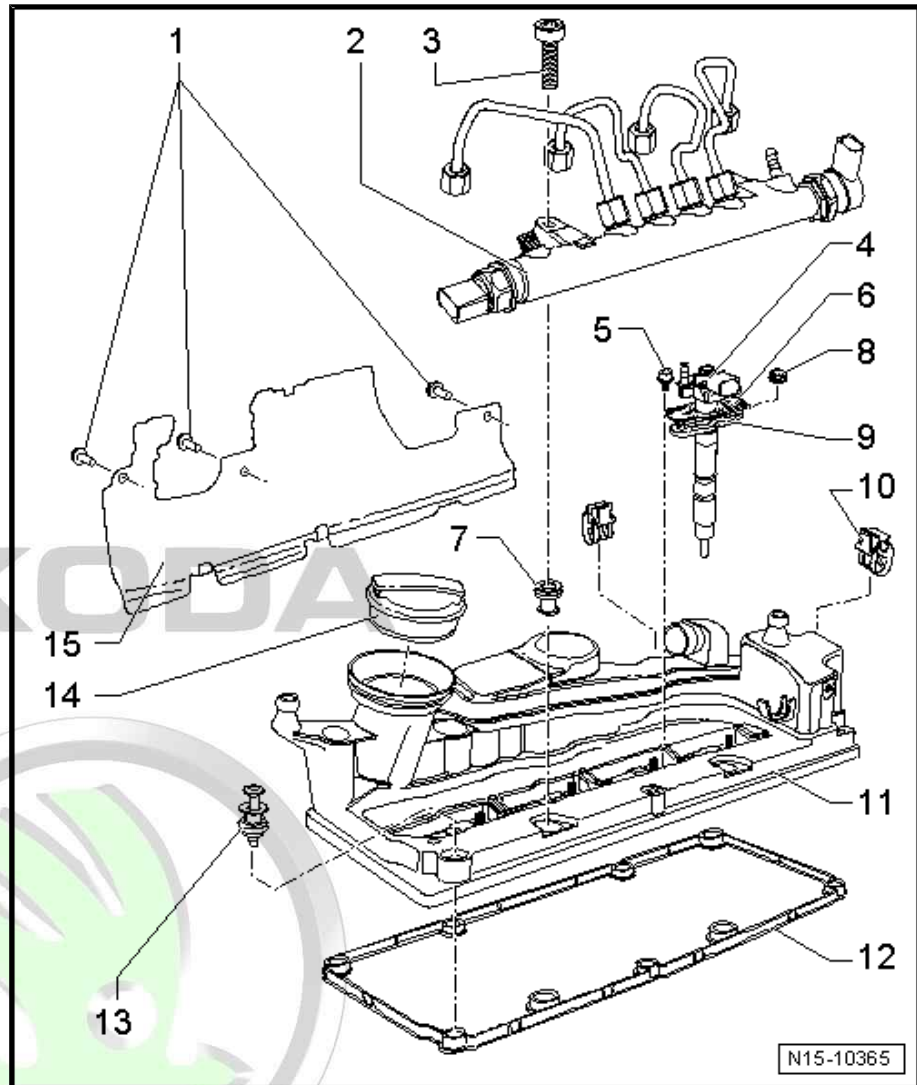
13 - 9 Nm

- ☐ observe tightening torque and tightening sequence ⇒ [page 68](#)
- ☐ Screw with bush and elastomer decoupling element pressed captively into the cylinder head cover

14 - Screw cap

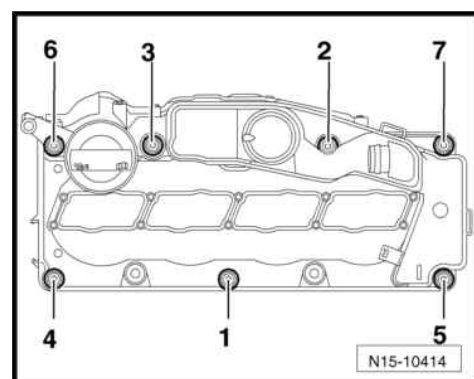
- ☐ Replace seal if damaged

15 - Heat shield



Cylinder head cover - tightening torque and tightening order

- Tighten the screws for the cylinder head cover in the sequence -1...7- to 9 Nm.



1.2 Removing and installing cylinder head cover

Removing

Observe all safety measures and notes for assembly work on the fuel and injection system as well as the rules for cleanliness

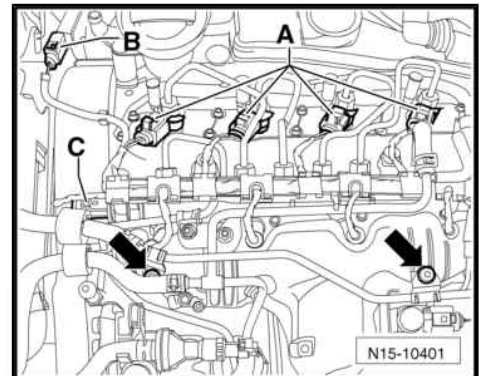
⇒ [page 2](#) .

- Remove engine cover ⇒ [page 17](#) .
- Take out the noise insulation at the injection units.
- Disconnect the plugs at the injection units -A-, the exhaust gas pressure sensor 1 -G450- -B- and the fuel pressure sender -G247- -C-.
- Release the fixing screws -arrows- of the coolant line from the intake manifold and lay the line in front of the intake manifold.
- Unclip the wiring loom from the wiring guide of the pencil type glow plugs.

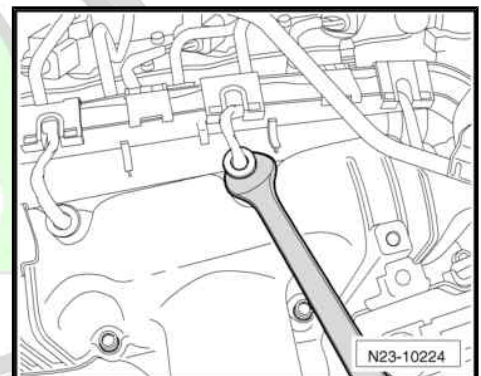


Caution

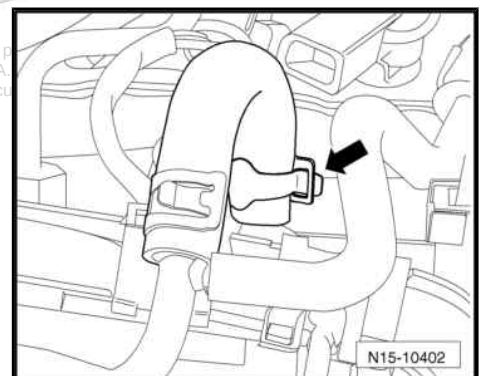
- ◆ *Carefully disconnect the plug from the pencil type glow plugs.*
- ◆ *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*



- Carefully remove the plugs from the pencil type glow plugs. During this process, support using an open-end wrench SW 11.
- Unscrew the fixing screw of the fuel return-flow line on the intake manifold.

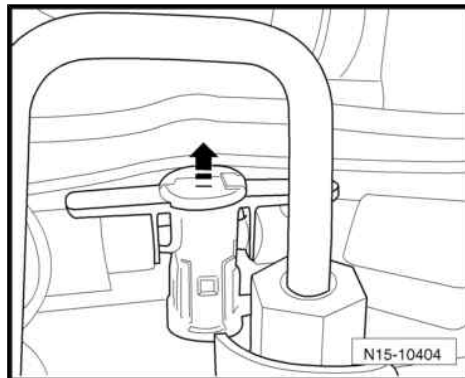


- Slacken the spring strap clamp -arrow- and detach the cable on the high pressure reservoir (rail).



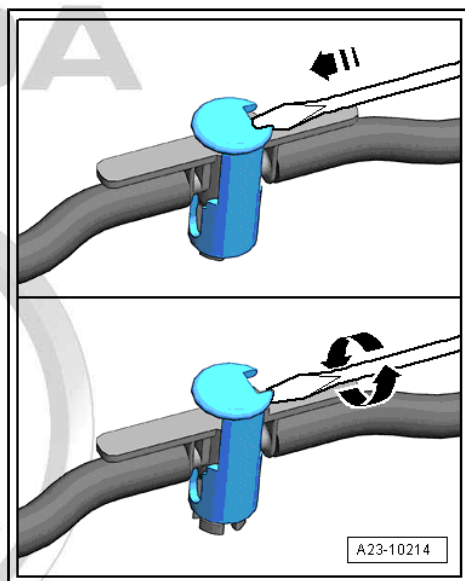


- Disconnect the connections of the fuel return-flow line at the injection units. To unlock, pull upwards -arrow-.

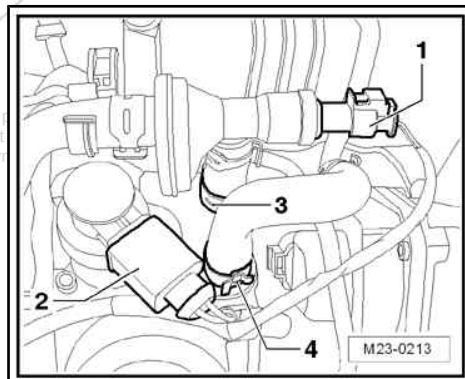


Note

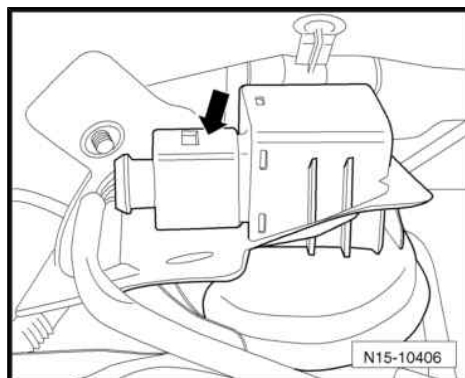
- ♦ Pay attention to cleanliness, no dirt must get into the removed return lines and the connections of the injection units.
- ♦ If the return line connection cannot be pulled upwards, open the connection by turning it with a narrow screwdriver.
- Slacken the spring strap clamp and detach the fuel return-flow line from the fuel filter.



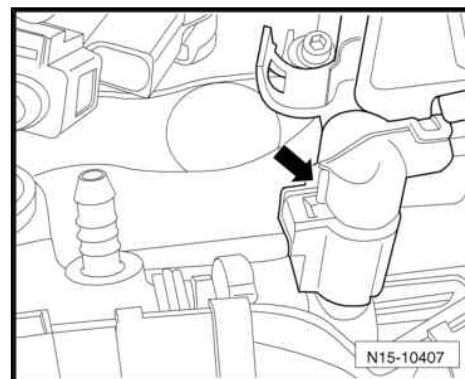
- Slacken the spring strap clamp -4- and detach the fuel return-flow line at the fuel-high pressure pump.
- Seal the lines so that no dirt can get into the fuel system.
- Remove fuel return-flow lines and lay them in front of the intake manifold.



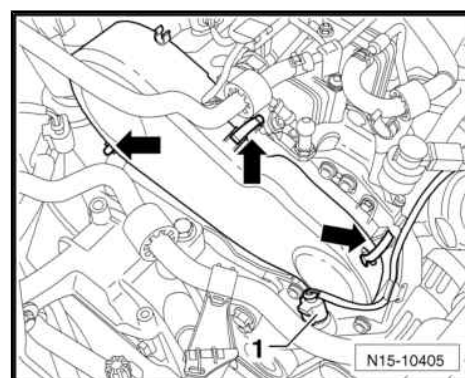
- Disconnect the plug from the position sender for charge pressure regulator -G581- -arrow- at the pressure unit from the exhaust turbocharger and extract the cable from the brackets.



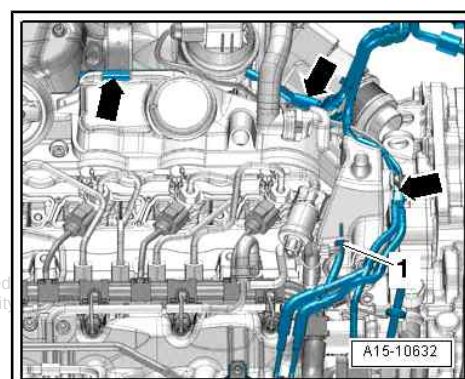
- Disconnect the plug from the fuel pressure regulating valve - N276- -arrow-.
- Remove the wiring on the high pressure reservoir (rail) and lay it to the side.



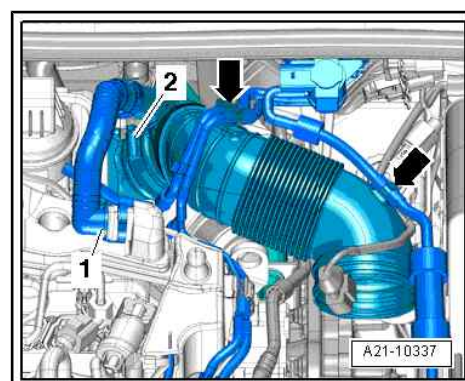
- Disconnect plug -1- from coolant temperature sender at radiator outlet -G83- , open clamps -arrows- and remove top part of toothed belt guard.



- Detach the vacuum hose -1- from the cylinder head cover.
- Expose the electrical lines and the remaining vacuum hoses -arrows-.

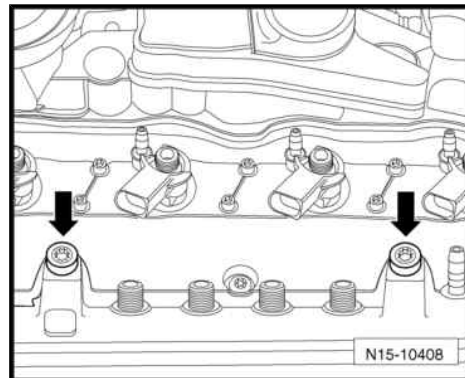


- Remove the hose -1- for the crankcase ventilation from the cylinder head cover, to do so press the release buttons.
- Remove the high pressure line between the fuel high pressure pump and the high pressure reservoir (rail).
- Unscrew the high pressure lines between the high pressure reservoir (rail) and the injection units.



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- Screw out the screws -arrows- and remove the high pressure reservoir (rail).
- Remove the injection units ➔ [page 178](#) .



- Slacken the screws for the cylinder head cover in the sequence -7...1- and remove the cylinder head cover.

Install

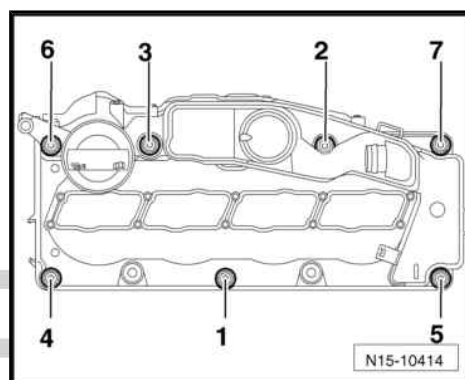
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace gasket for cylinder head cover if damaged or leaking.

- Tighten screws for cylinder head cover ➔ [page 68](#) .
- Install the injection units ➔ [page 178](#) .



Tightening torques

- ◆ Cylinder head cover - Summary of components: ➔ [page 67](#)
- ◆ Fuel system - Summary of components: ➔ [page 176](#)

1.3 Cylinder head - summary of components



Note

- ◆ *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- ◆ *You must replace the whole of the coolant if you wish to replace the cylinder head.*

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1 - Cylinder head

- ☐ removing and installing ⇒ [page 74](#)
- ☐ check for distortion ⇒ [page 74](#)
- ☐ after replacing fill entire system with fresh coolant

2 - Supporting plate

- ☐ for cylinder head screw

3 - Cylinder head bolt

- ☐ pay attention to sequence for loosening and tightening ⇒ [page 74](#)
- ☐ before fitting insert washers in the cylinder head

4 - 25 Nm

5 - Rear left lifting eye on cylinder head?

6 - Gasket

- ☐ replace

7 - Vacuum pump



WARNING

Under no circumstances must the vacuum pump be disassembled, otherwise it can lead to malfunction of the vacuum part. This will result in a failure of the brake booster.

- ☐ removing and installing ⇒ [page 82](#)

8 - 9 Nm

9 - Coolant connection fittings

10 - 10 Nm

11 - Gasket

- ☐ replace

12 - 25 Nm

13 - Front left lifting eye on cylinder head?

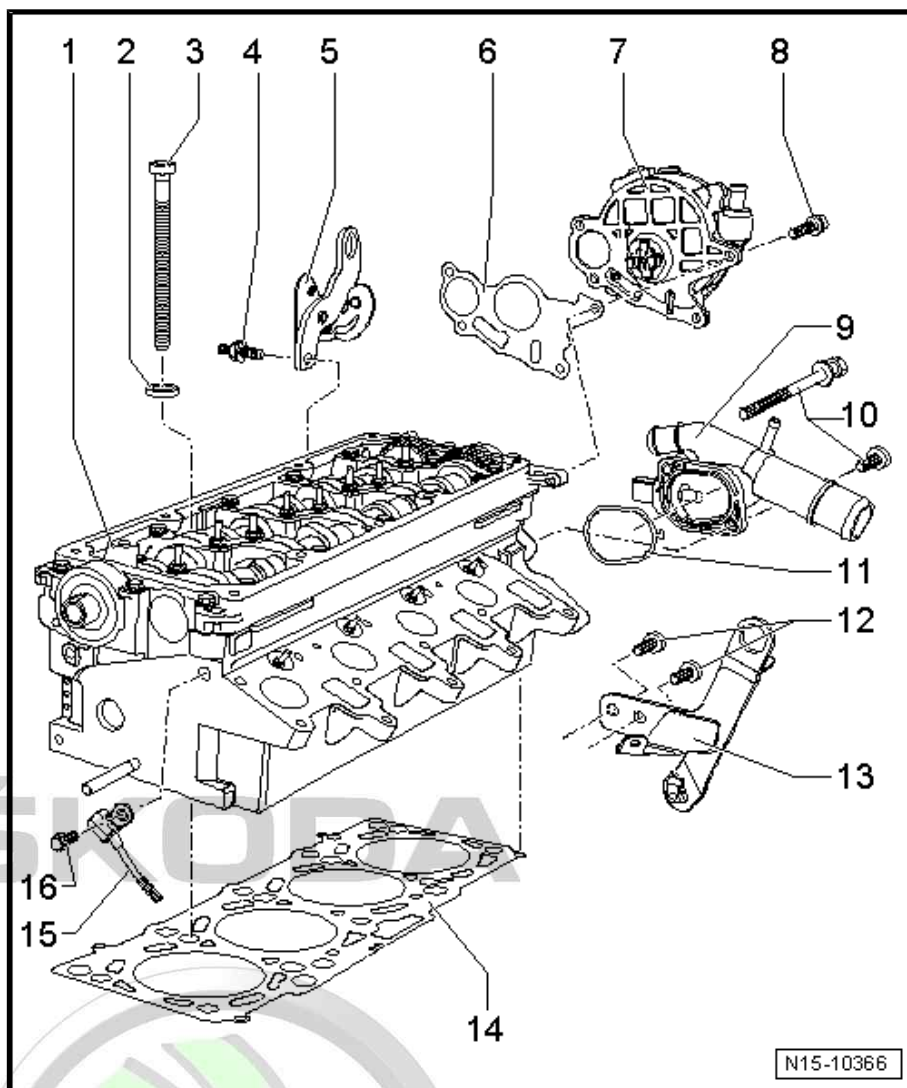
- ☐ the front right lifting eye is attached to the bracket for auxiliary units in the same way ⇒ [page 29](#)

14 - Cylinder head gasket

- ☐ replace
- ☐ Pay attention to the marking ⇒ [page 74](#)
- ☐ after replacing fill entire system with fresh coolant

15 - Hall sender -G40-

- ☐ for camshaft position
- ☐ removing and installing ⇒ [page 84](#)



N15-10366



16 - 10 Nm

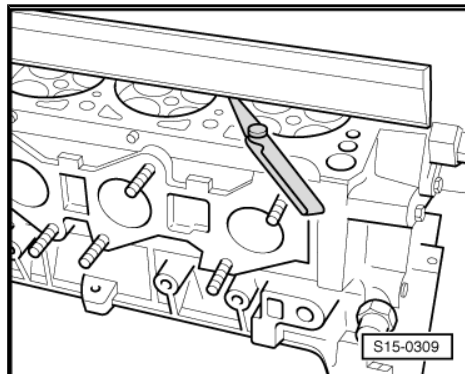
Inspecting the cylinder head for distortion

- Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.
- Maximum permissible deviation: 0.05 mm.



Note

It is not permissible to rework the cylinder heads of diesel engines.



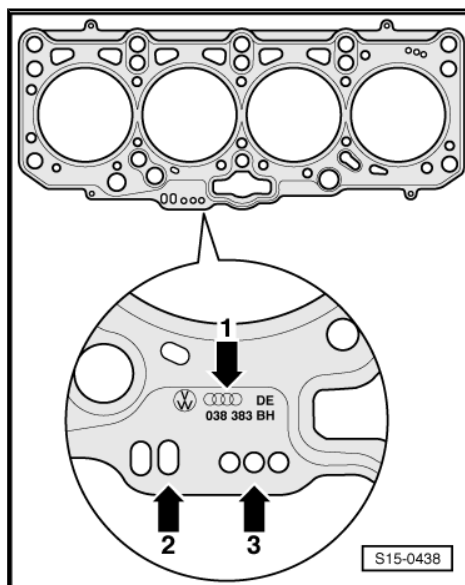
Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

- ◆ *Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. If only the gasket is replaced, then it must be replaced with a new gasket with the same marking.*
- ◆ *When installing new pistons or a partial engine, determine the piston projection at TDC ➔ [page 64](#) .*



1.4 Removing and installing cylinder head

Special tools and workshop equipment required

- ◆ Guide bolt -MP1-208 (3070)-
- ◆ Counterholder -T10051 -
- ◆ Extractor -T10052-
- ◆ Socket insert XZN 10 -T10385-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Locking agent -D 000 600 A2-
- ◆ Protective goggles and gloves



1.4.1 Removing



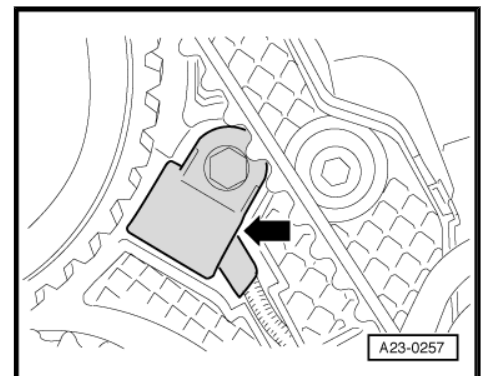
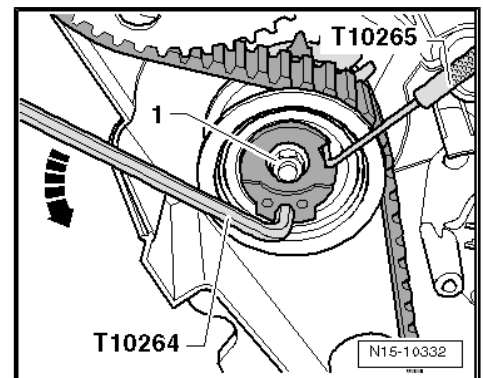
Caution

Please observe the following when undertaking all assembly work, particularly in the engine compartment, due to its cramped construction.

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*

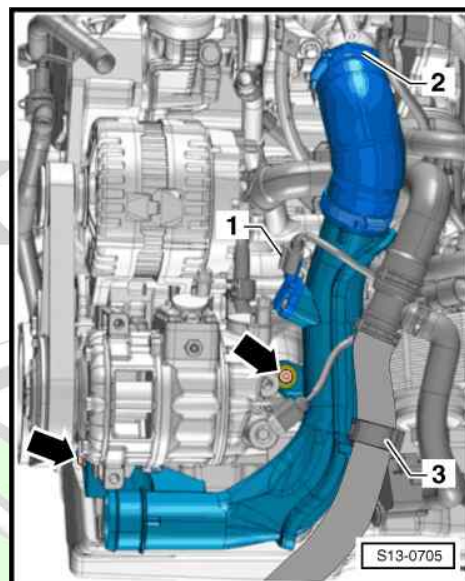
Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ➔ [page 2](#) .

- Disconnect the battery-earth strap with the ignition off ➔ Electrical System; Rep. Gr. 27 .
- Remove engine cover ➔ [page 17](#) .
- Remove air filter housing with air mass meter -G70- and intake hose ➔ [page 196](#) .
- Remove battery and battery tray ➔ Electrical System; Rep. Gr. 27
- Remove cylinder head cover ➔ [page 69](#) .
- Detach toothed belt from timing belt gear - camshaft ➔ [page 37](#) .
- Remove the rig tool -T10265- .
- Unscrew nut -1-.
- Unscrew the hall sender -G40- -arrow- and lay it to the side.
- Remove timing belt gear - camshaft and pull off hub for camshaft with extractor -T10052- ➔ [page 88](#) .
- Remove fan shroud with radiator ➔ [page 132](#) .
- Drain coolant ➔ [page 111](#) .

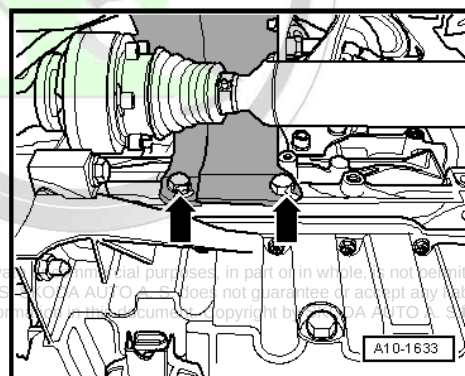




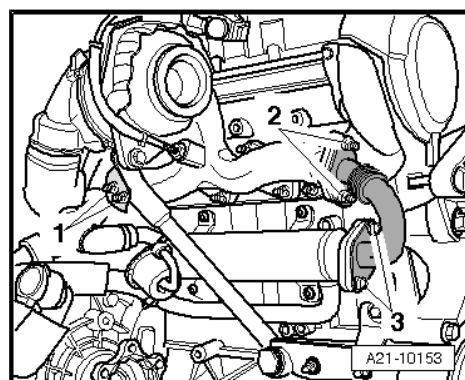
- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.



- Release screws -arrows- and remove heat shield for right drive shaft, if present on the vehicle.



- Release nuts -2- and screws -3- and remove the connection pipe for exhaust gas recirculation.



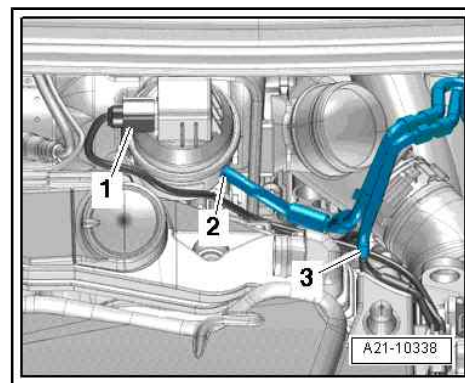
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- Disconnect the plug -1- on the position sender for charge pressure regulator -G581- .
- Detach vacuum hose -2- from vacuum setting element of the exhaust turbocharger.
- Disconnect vacuum hose -3-.



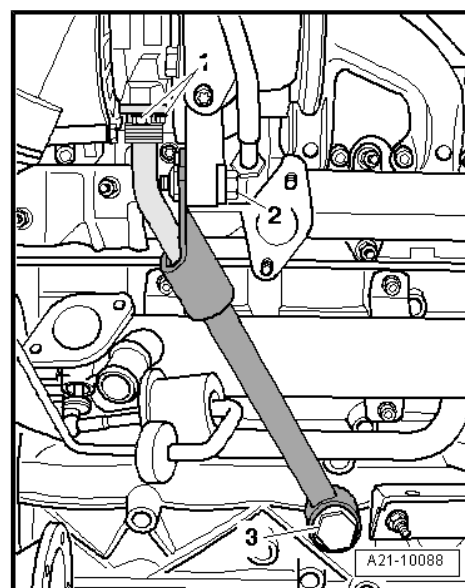
Caution

The exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) covers the top bolted connection of the support for exhaust turbocharger and must not be bent. For this reason it must be removed.

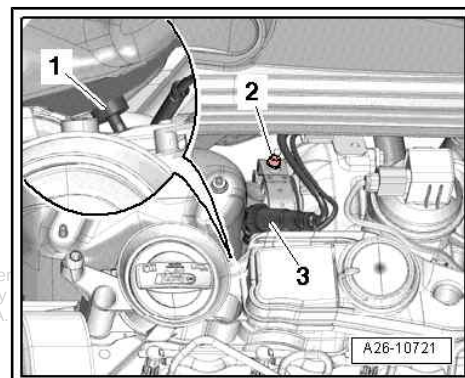


- Remove exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) => [page 162](#) .
- Release screws -1 and 2- and hollow screw -3-.
- Remove support for exhaust turbocharger with oil return line.

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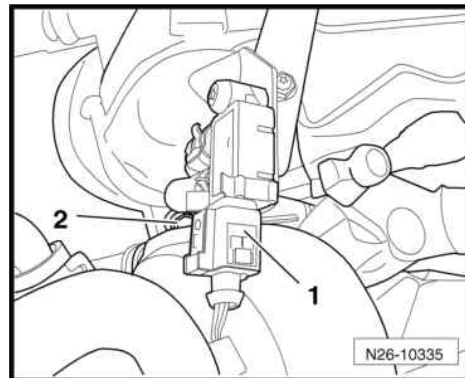
- Slacken screw -2- and remove clamp for diesel particle filter.



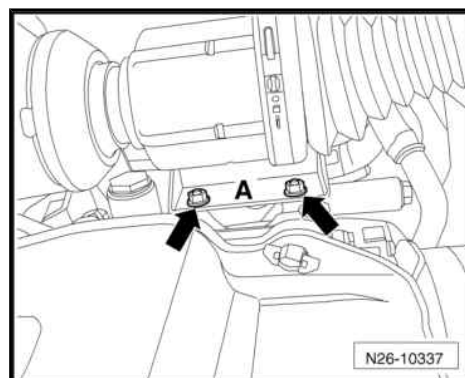
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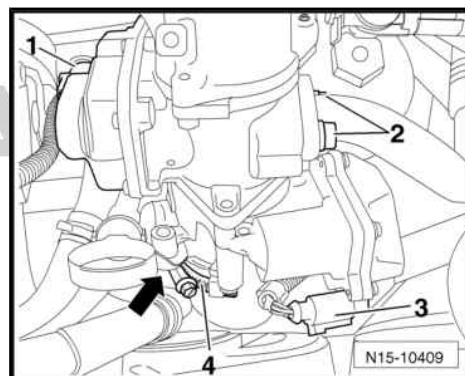
- Unscrew the top screw -2- for attaching the diesel particle filter.



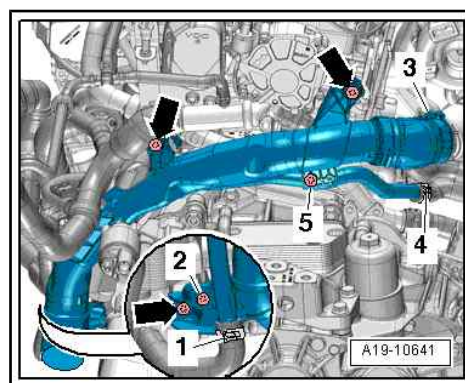
- Unscrew the fixing nuts -arrows- of the bracket for diesel particle filter -A- on the cylinder block and tie up the diesel particle filter to the rear.



- Disconnect the plug -1- on the exhaust gas recirculation valve -N18- and the plug -3- on the throttle valve control unit -J338- .
- Release the screw -arrow- on the oil dipstick guide pipe.
- Unscrew screws -2- on the pipe for exhaust gas recirculation.

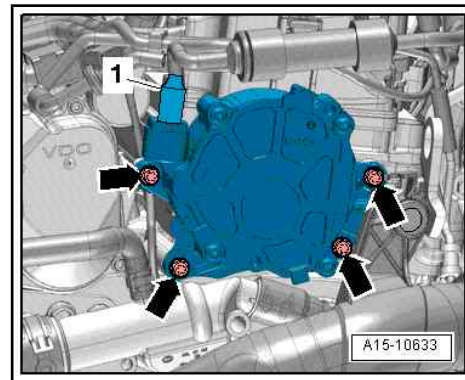


- Unscrew screws -2 and 5- and screws -arrows-.
- Release screw clamp -3- and remove left charge air pipe.

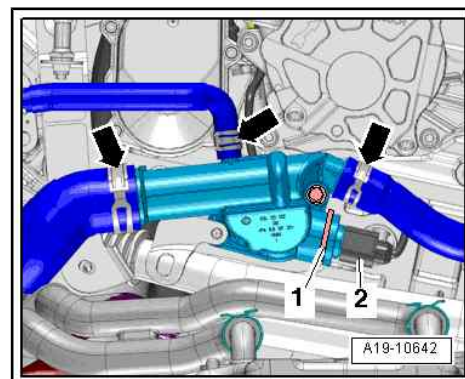


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- Remove the vacuum hose -1- from the vacuum pump.



- Disconnect plug -2- from coolant temperature sender -G62- .
- Remove the coolant hoses from the connection fitting, to do so slacken the hose clamps -arrows-.

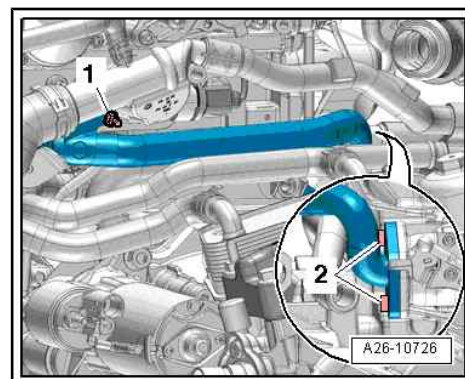


- Release nut -1- and screws -2-, remove the pipe for exhaust gas recirculation.

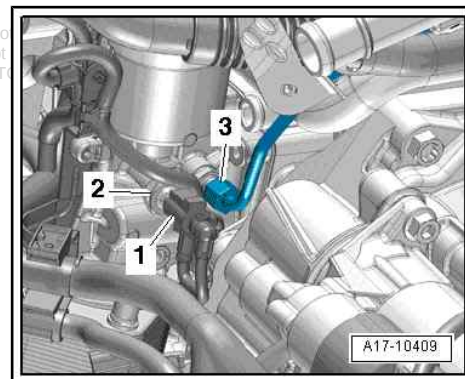


Note

The bottom screw on the exhaust gas recirculation radiator can be unscrewed using the socket insert -T10385- .

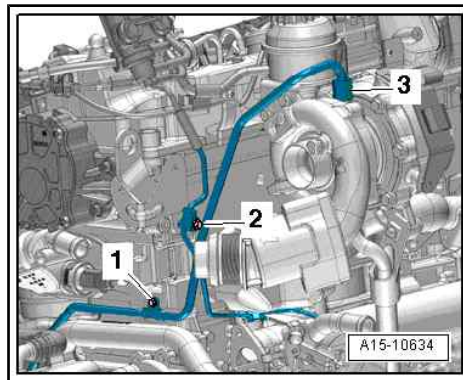


- Unscrew the oil feed line from the connection on the oil filter holder. To do so, counterhold on the hexagon using an open-end wrench and slacken the union nut -3-.

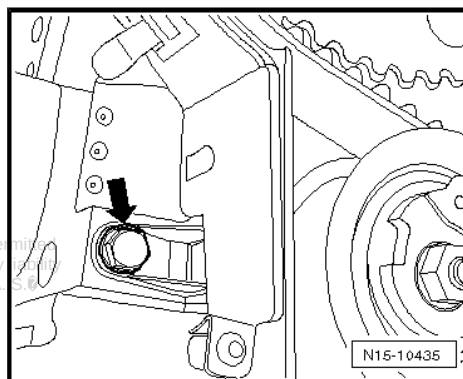




- Release the nut -2- at the retaining clip for the vacuum line.
- Release screw -1-.
- Unscrew the oil feed line from the connection on the exhaust gas turbocharger. To do so, counterhold on the hexagon using an open-end wrench and slacken the union nut -3-.



- Unscrew the screw -arrow- on the rear timing belt guard.



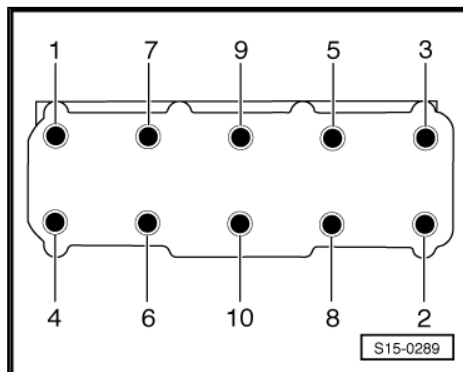
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- Release the cylinder head bolts in the order -1...10-.



Note

- ◆ *The assistance of a 2nd mechanic is required for lifting out the cylinder head.*
- ◆ *The timing belt tensioning pulley is removed from the pin screw when lifting out the cylinder head.*
- First of all raise the cylinder head at the gearbox side and then thread it out of the rear toothed belt guard. Make sure that the timing belt tensioning pulley does not fall down.
- Place down the cylinder head in such a way that the oil return flow line does not bend, if necessary place a piece of wood under the exhaust manifold.



Caution

Risk of damage to the pencil type glow plugs when placing down the cylinder head.

- ◆ *If the cylinder head is removed, do not place it down with the installed pencil type glow plugs on the sealing surface as the glow pencils protrude slightly beyond the sealing surface.*

1.4.2 Install



Note

- ◆ *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- ◆ *Replace cylinder head bolts.*
- ◆ *When undertaking assembly replace self-locking nuts and screws as well as gasket rings and gaskets which have been tightened to a torquing angle.*
- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *Treat the seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the cylinder head.*
- ◆ *Secure all hose connections with corresponding hose clips.*



WARNING

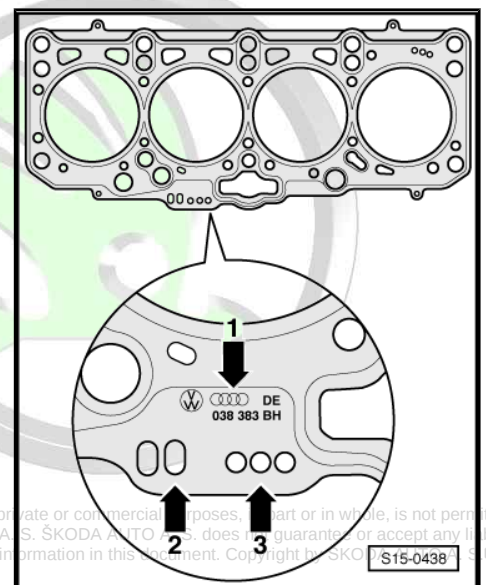
Wear protective gloves when working with sealant and grease remover!

- Make sure that when cleaning the cylinder head and cylinder block no impurities can get into the cylinder or into the oil and coolant galleries.
- Carefully remove old residual sealant from the cylinder head/cylinder block using a chemical sealant remover.
- Remove the crankshaft arrester -T10050- before fitting on the cylinder head and turn back the crankshaft in the opposite direction of rotation of the engine until all the pistons are almost evenly at TDC.
- Pay attention to the identification of the cylinder head seal.
- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

- ◆ *Install a new cylinder head gasket with the same marking; whether or not the cylinder head was replaced.*
- ◆ *If parts of the crankshaft drive were replaced then the new cylinder head gasket must be redefined by measuring the protrusion of the pistons in TDC.*
- Position the cylinder head gasket with the marking to the top.



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S15-0438

- For centering, screw in guide bolts -3070- into the outer holes on the suction side.



Note

The tensioning roller must be fitted onto the stud bolt when placing on the cylinder head.

- Fit on cylinder head, insert all 8 cylinder head bolts and tighten by hand.
- Remove the guide bolts by screwing out with a bolt tightener from 3070 through the bolt holes and insert the cylinder head screws.
- Tighten the cylinder head in four stages in the indicated tightening sequence:

Stage	Tighten
I	Pre-tighten with the torque wrench to 30 Nm.
II	Pre-tighten with the torque wrench to 50 Nm.
III	Using a rigid wrench torque a further 90° 1/4 turn.
IV	Using a rigid wrench torque a further 90° 1/4 turn.



Note

Tightening up the cylinder head bolts after doing repair work is not necessary.

Further installation occurs in reverse order, while paying attention to the following:

- Install exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) ➔ [page 162](#) .
- The tightening torques which are missing can be found in the corresponding explosion view drawing.
- Perform a test drive and interrogate fault memory and erase ➔ Vehicle diagnosis, testing and information system VAS 5051.



Note

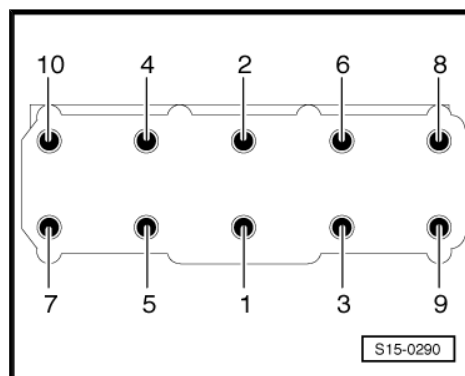
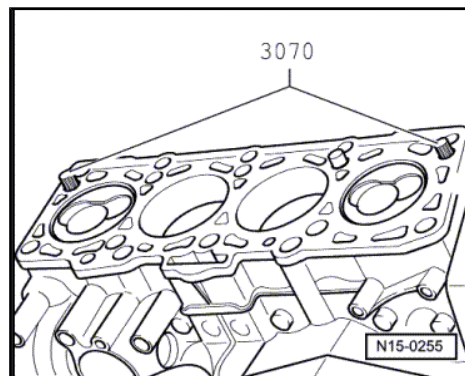
After deleting the fault memory of the engine control unit the readiness code must be re-generated.

1.5 Removing and installing the vacuum pump



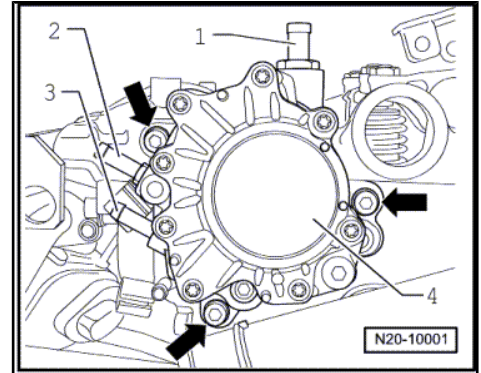
WARNING

Under no circumstances must the vacuum pump be disassembled, otherwise it can lead to malfunction of the vacuum part. This will result in a failure of the brake booster.



Removing

- Remove the air filter housing ➔ [page 196](#) .
- Pull off the vacuum line -1- from the vacuum pump -4-.
- Unscrew the fixing screws of the left charge air pipe and then press the left charge air pipe slightly downwards in order to reach the rear bolted connection of the vacuum pump.



- Unscrew securing bolts -arrows-.
- Remove the vacuum pump -4- from the cylinder head.

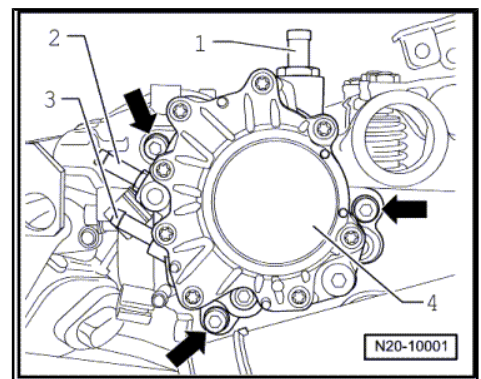
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ♦ Pay attention to the correct position of the coupling of the vacuum pump in the camshaft.
- ♦ Always replace the gasket of the vacuum pump.
- Install the vacuum pump and tighten the fixing screws to 10 Nm.
- Connect the vacuum line -1- of the brake servo unit to the vacuum pump.



1.6 Testing the compression



Note

- ♦ A rough test of the compression pressure can be carried out in the targeted fault finding ➔ Vehicle diagnosis, testing and information system VAS 5051.
- ♦ The work sequence with the compression tester, as described in the following, gives more precise values.

Special tools and workshop equipment required

- ♦ Compression tester, e.g. -V.A.G 1763 -
- ♦ Adapter, e.g. -V.A.G 1381/12-
- ♦ Hinged wrench -3220-

Test condition

- Engine oil temperature at least 30 °C

Test sequence

- Remove the glow plug for the relevant cylinder with the hinged wrench -3220- ➔ [page 214](#)

- Screw in the adapter -V.A.G 1381/12- instead of the pencil type glow plug.
- Check compression pressure using the compression tester - V.A.G 1763- .



Note

Use of tester ⇒ Operating Instructions .

- Operate starter until the tester no longer indicates a pressure rise.

Compression readings

new	Wear limit	permissible difference between cylinders
Overpressure	Overpressure	Overpressure
2.5...3.1 MPa	1.9 MPa	maximum 0.5 MPa
25 ... 31 bar	19 bar	maximum 5 bar

Perform after the compression pressure test:

- Install the pencil type glow plug of the corresponding cylinder ⇒ [page 214](#) .
- Interrogating and erasing fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.



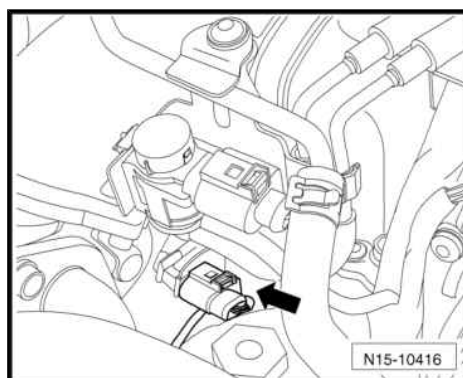
Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

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1.7 Removing and installing Hall sender - G40-

- Remove engine cover ⇒ [page 17](#) .
- Removing toothed belt ⇒ [page 37](#) .
- Disconnect the plug from the Hall sender -G40- -arrow-.
- Take the plug out of its bracket.



- Unscrew Hall sender -G40- -arrow-.

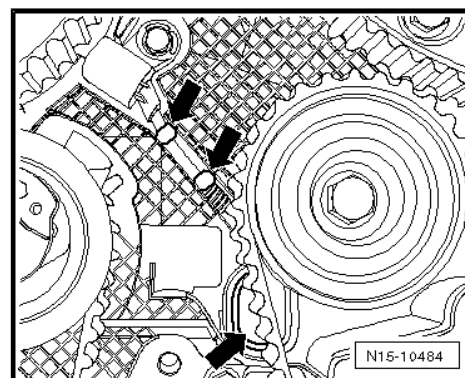
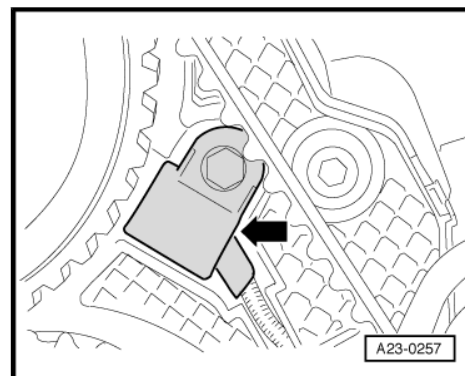
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- Remove the pegs and the cover of the repair hole -arrows- with a screwdriver.
- Unscrew the Hall sender -G40- from the cylinder head and guide its plug through the repair hole in the toothed belt guard.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ◆ Close the repair hole in the toothed belt guard with a rubber plug ⇒ (Electronic Catalogue of Original Parts) .
- install toothed belt and set the timing ⇒ [page 42](#) .



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2 Repairing Valve Gear

2.1 Summary of components



Note

- ◆ After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic tappets must settle (otherwise valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.
- ◆ Always replace gasket rings and seals.

1 - Sealing ring

- ☐ Do not additionally lubricate or grease sealing lips of the gasket ring
- ☐ before fitting remove oil residues on the camshaft studs with a clean cloth
- ☐ to fit cover slot on the camshaft cone with adhesive tape (e.g. Scotch tape)
- ☐ removing and installing
⇒ [page 87](#)

2 - 10 Nm

- ☐ order of tightening
⇒ [page 88](#)

3 - 10 Nm

- ☐ order of tightening
⇒ [page 88](#)

4 - Bearing frame

- ☐ pay attention to sequence for loosening and tightening
⇒ [page 88](#)
- ☐ Seal with silicone sealant -D 176 501 A1-

5 - Exhaust camshaft

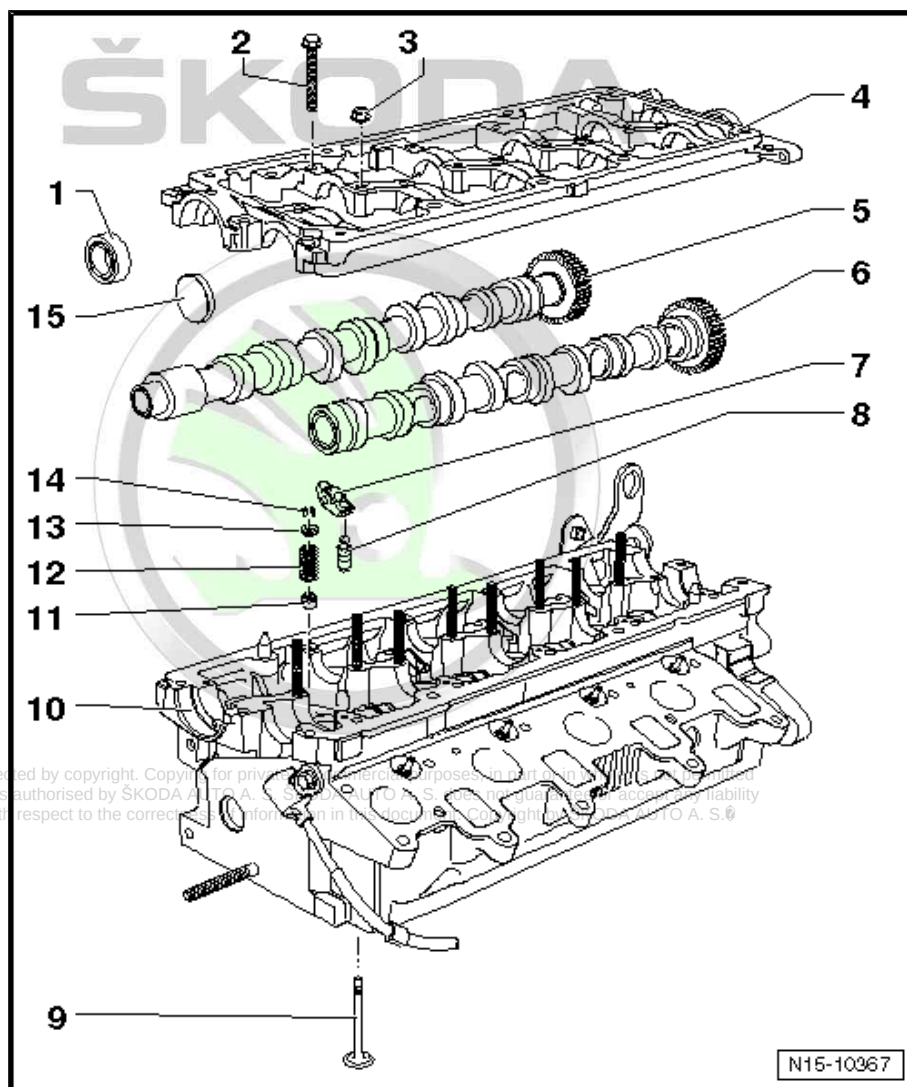
- ☐ removing and installing
⇒ [page 88](#)

6 - Inlet camshaft

- ☐ removing and installing
⇒ [page 88](#)

7 - Roller rocker arm

- ☐ Mark installation position
- ☐ do not interchange
- ☐ Check smooth operation of cylindrical-roller bearings
- ☐ oil contact surfaces



8 - Supporting element

- ☐ Mark installation position
- ☐ oil the contact surfaces before installing

9 - Valve

- ☐ do not rework, only grinding in is permissible
- ☐ mark the fitting position for re-installation
- ☐ Valve dimensions ⇒ [page 96](#)
- ☐ inspecting valve guides ⇒ [page 96](#)

10 - Cylinder head

- ☐ pay attention to the notes ⇒ [page 72](#)
- ☐ check for distortion ⇒ [page 74](#)
- ☐ removing and installing ⇒ [page 74](#)
- ☐ after replacing fill entire system with fresh coolant

11 - Valve stem seal

- ☐ replace ⇒ [page 93](#)

12 - Valve spring

13 - Valve spring retainer

14 - Collets

15 - Screw cap

- ☐ replace
- ☐ removing: Plunge into the installed bearing frame using a screwdriver and lever out.
- ☐ installing: Drive in without sealant using a suitable thrust piece until flush.

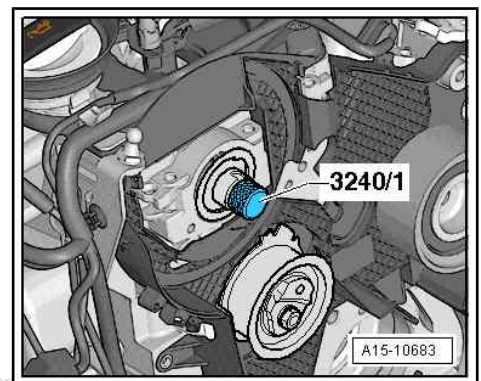
2.2 Replacing camshaft gasket ring

Special tools and workshop equipment required

- ◆ Insertion tool -MP 1-214 (10-203)-
- ◆ Gasket ring extractor -T30003 (3240)-
- ◆ Screw M12x1.5x75 from the insertion tool -MP 1-214 (10-203)-

Removing

- Take toothed belt off timing belt gear - camshaft and timing belt gear - high pressure pump ⇒ [page 88](#) .
- Remove timing belt gear - camshaft and hub ⇒ [page 88](#) .
- Insert thrust piece -3240/1- into the camshaft.
- Unscrew inner part of the gasket ring extractor 3240 two turns (approx. 3 mm) out of the outer part and lock with knurled screw.



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- Oil the thread head of the gasket ring extractor, position and forcibly screw into the gasket ring as far as possible.
- Release knurled screw and turn the inner side against the camshaft until the gasket ring is pulled out.

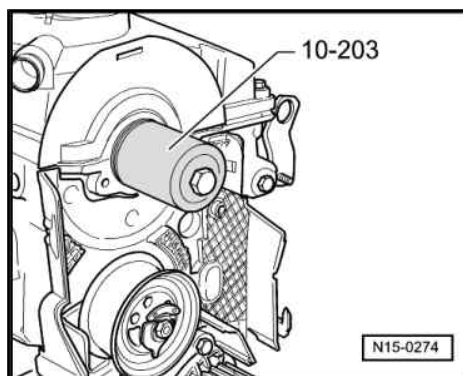
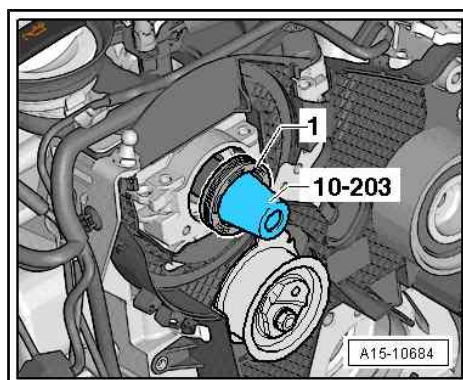
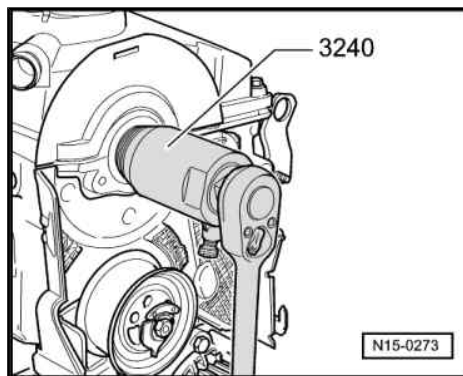
Install



Note

The sealing lip of the gasket ring must neither be oiled nor greased additionally.

- Fit the guide bushing from -MP 1-214 (10-203)- onto the camshaft as shown in the illustration.
- Carefully slide the gasket ring -1- over the guide bushing onto the camshaft.
- Press in the gasket ring with the thrust piece of the insertion tool -MP 1-214 (10-203)- and screw M12x1.5x75 up to the stop.
- Install the hub and the timing belt gear - camshaft
⇒ [page 88](#) .
- Installing the timing belt ⇒ [page 42](#) .



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2.3 Removing and installing camshafts

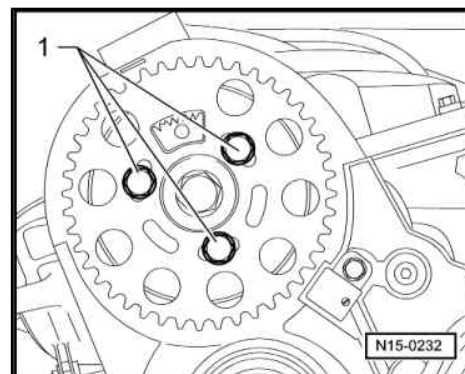
Special tools and workshop equipment required

- ♦ Counterholder -T10051 -
- ♦ Extractor -T10052-
- ♦ Camshaft-insertion tool -T40094-
- ♦ Camshaft-insertion tool -T40095-
- ♦ Tensioning tool -T40096/1-
- ♦ Silicone sealant -D 176 501 A1-
- ♦ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ♦ Cleaning agent and grease remover e.g. -D 000 401 04-
- ♦ Protective goggles and gloves

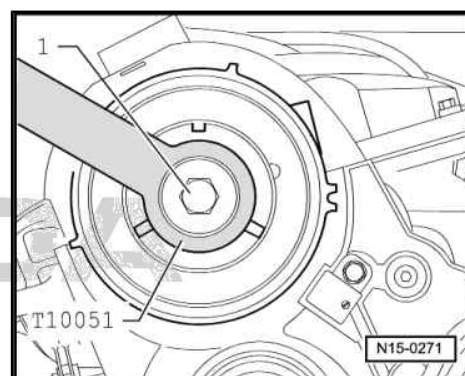
Removing

- Cylinder head fitted.

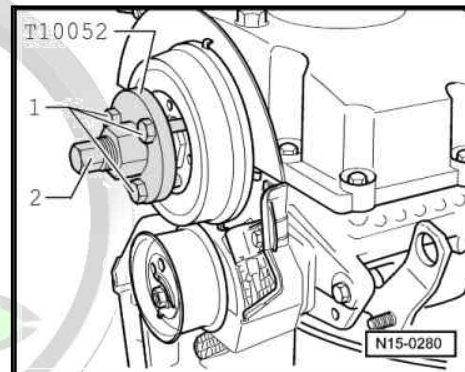
- Take toothed belt off timing belt gear - camshaft and timing belt gear - high pressure pump ⇒ [page 88](#) .
- Remove cylinder head cover ⇒ [page 69](#) .
- Release screws -1- and remove timing belt gear - camshaft.



- Slacken screw -1- for the hub of the camshaft, to do so counterhold with counterholder -T10051- .
- Unscrew screw by approx. 2 turns.



- Position the extractor -T10052- at the hub of the camshaft and screw the screws -1- into the hub.
- Screw in the screw -2- for removing the hub of the camshaft and counterhold on the hexagon (SW 30) of the extractor.
- Remove hub from cone of camshaft.
- Remove vacuum pump ⇒ [page 82](#) .



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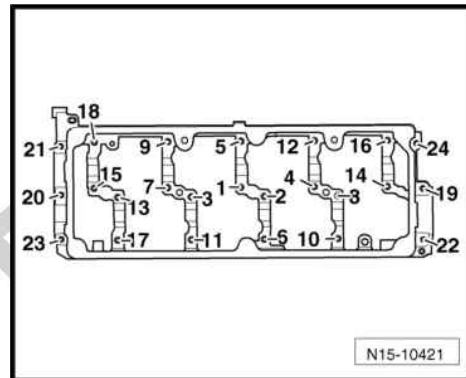
- Release the screws for the bearing frame in the sequence -24...1-.
- Unscrew the screws and carefully loosen the bearing frame from the bonding.
- Mark the camshafts for reinstalling and remove.

Install



WARNING

Wear protective gloves when working with sealant and grease remover!



- Remove residual sealant on the bearing frame and cylinder head using a chemical sealant remover.
- Clean sealing surfaces, they must be free of oil and grease.
- Oil contact surfaces of camshafts.

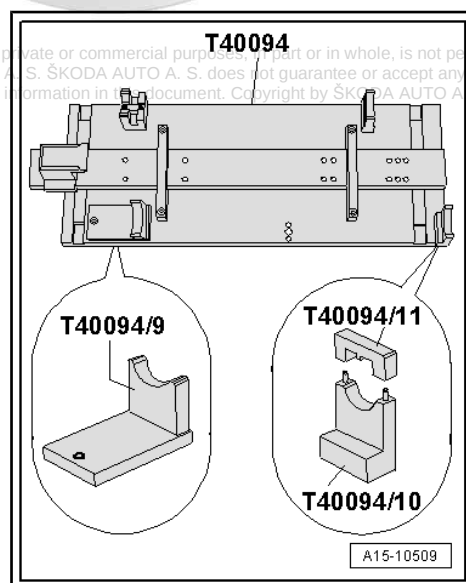


Caution

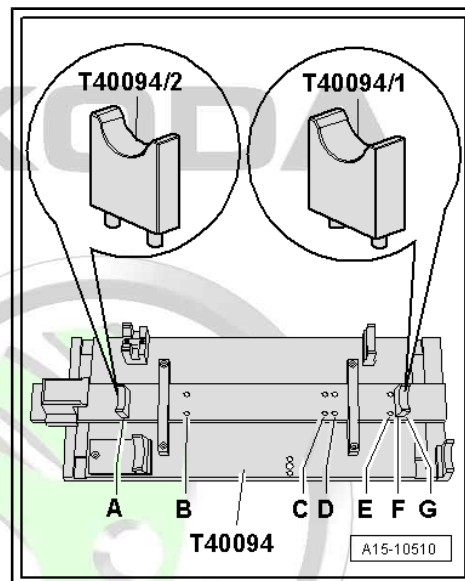
The camshafts must only be installed using the camshaft-insertion tool -T40094- as described in the following, otherwise the axial bearing in the bearing frame can be destroyed and the cylinder head must be replaced.

Set up the camshaft-insertion tool -T40094- as follows:

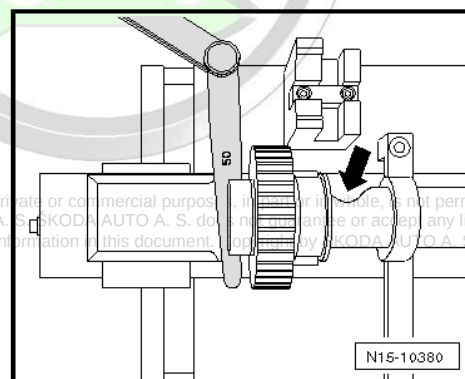
- Tighten the supports -T40094/9- and -T40094/10- (with T40094/11-) to the base plate as shown in the illustration. It may be necessary to remove the bolted supports in this location.



- Position the support -T40094/1- onto the plug location -F- and the support -T40094/2- onto the plug location -A-.
- Insert the inlet camshaft in the supports -T40094/1 - and -T40094/2- .

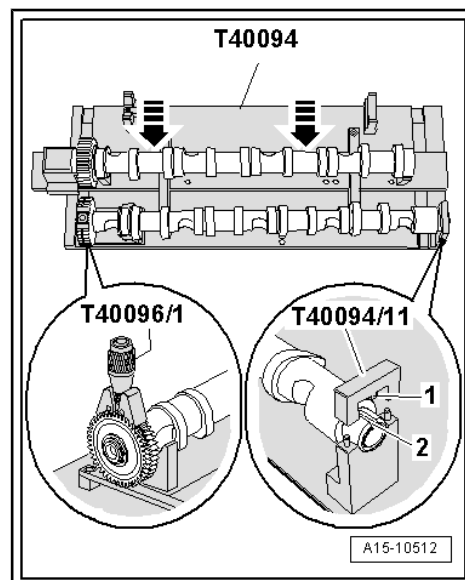


- The protrusion -arrow- of the cylinder head bolt must point to the outside.
- Fit on a feeler gauge of 0.50 mm in order to balance out any play and slide the support -T40094/8- into the groove of the inlet camshaft.



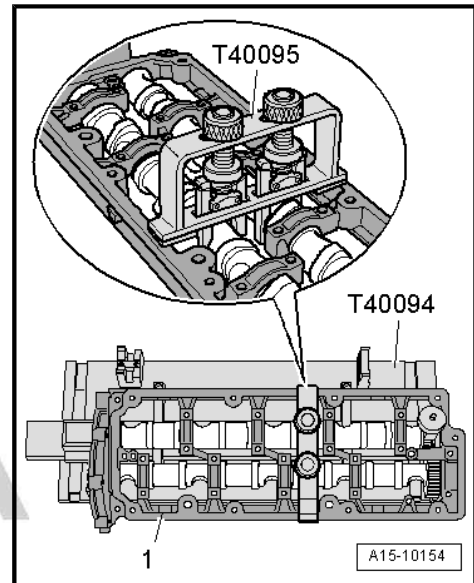
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- Insert the outlet camshaft in the supports -T40094/9- and -T40094/11- .
- Interlock the outlet camshaft with the cover -T40094/11- .
- The peg -1- of the cover must engage in the groove -2- in the camshaft.
- Position the tensioning tool -T40096/1- on the serration of the outlet camshaft in such a way that each leg of the tensioning tool engages into each one half-pinion.
- The wider leg must engage in the wider half-pinion.
- Tension the tensioning tool with the knurled wheel until the tooth flanks are flush with each other.
- Slide the inlet camshaft to the outlet camshaft until the serrations are in mesh -arrows-.





- Position the bearing frame onto the camshafts.
- All of the camshaft bearings must rest on the camshafts.
- Position the camshaft-insertion tool -T40095- and fix the camshafts in the bearing frame as shown in the illustration.
- Remove the cover -T40094/11- and slide the support -T40094/8- out of the groove of the inlet camshaft.



Note

Pay attention to the use by date on sealant.

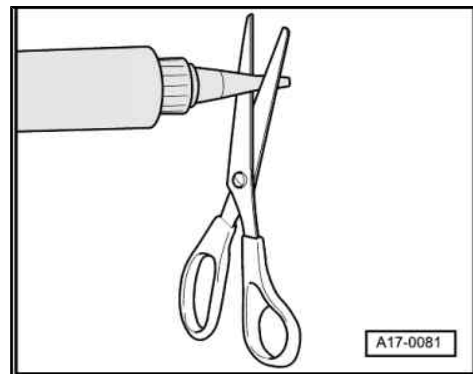
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 2 mm).



Caution

Risk of contamination of the camshaft bearings through excess sealant.

- ◆ ***Do not apply thicker sealant beads than indicated.***



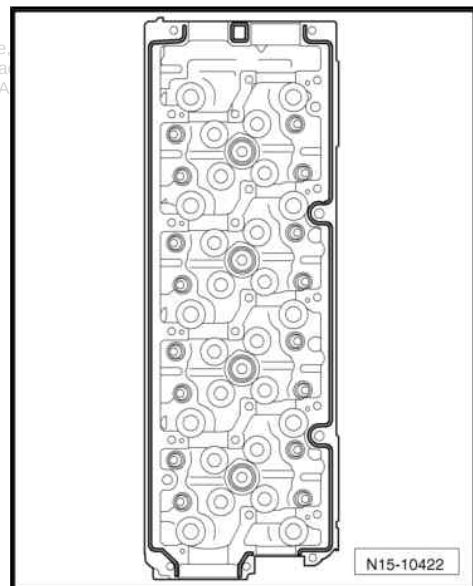
- Apply sealant beads onto the clean sealing surfaces of the cylinder head as shown in the illustration.
- Thickness of sealant beads: 2...3 mm.



Note

The bearing frame must be installed within 5 minutes after applying the silicone sealant.

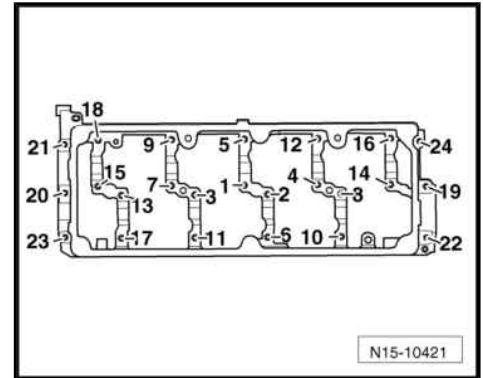
- Remove the camshafts together with the bearing frame, the camshaft-insertion tool -T40095- and the tensioning tool -T40096/1- from the camshaft-insertion tool -T40094- and carefully fit into the cylinder head.



- First of all tighten the screws and the nuts for the bearing frame in the sequence -1°...°24- by hand.
 - The bearing frame must rest on the cylinder head with its complete contact surface.
 - First of all tighten the screws and the nuts for the bearing frame in the sequence -1°...°24- by hand.
- Tightening torque: 10 Nm
- Remove the camshaft-insertion tool -T40095- and the tensioning tool -T40096/1- .

Further installation occurs in reverse order, while paying attention to the following:

- Install camshaft seal ⇒ [page 87](#) .
- Drive in new screw cap ⇒ [page 86](#) .
- Install vacuum pump ⇒ [page 82](#) .
- Install cylinder head cover ⇒ [page 69](#) .



Note

- ◆ *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic tappets must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

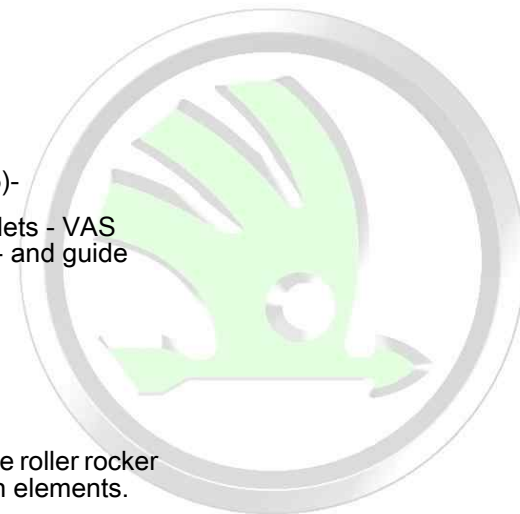
2.4 Replacing valve stem seals

Special tools and workshop equipment required

- ◆ Valve stem seal extractor -MP 1-230 (3364)-
- ◆ Valve stem seal insertion tool - MP 1-233 (3365)-
- ◆ Disassembly and assembly device for valve collets - VAS 5161- with knurled spacer ring -VAS 5161/23-1- and guide plate -VAS 5161/23-

Work procedure

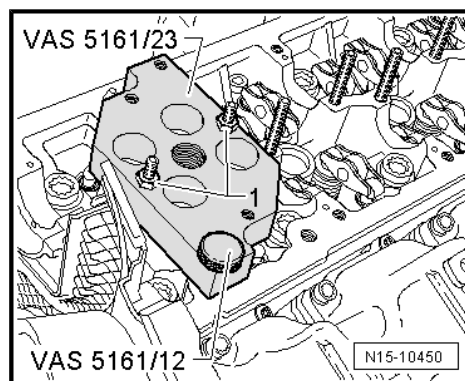
- Remove all glow plugs ⇒ [page 214](#) .
- Remove the camshafts ⇒ [page 88](#) .
- When installing again, mark the assignment of the roller rocker arms and the hydraulic clearance compensation elements.
- Remove the roller rocker arms together with the hydraulic balancing elements and lay aside on a clean surface.
- Put the piston of the relevant cylinder at “bottom dead centre”.



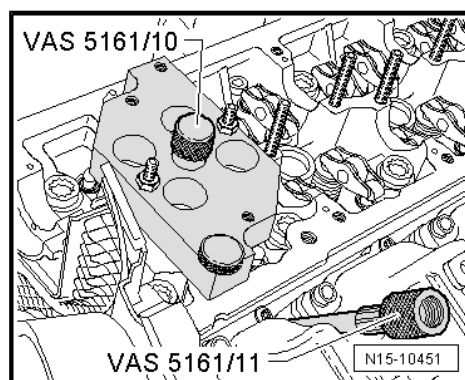
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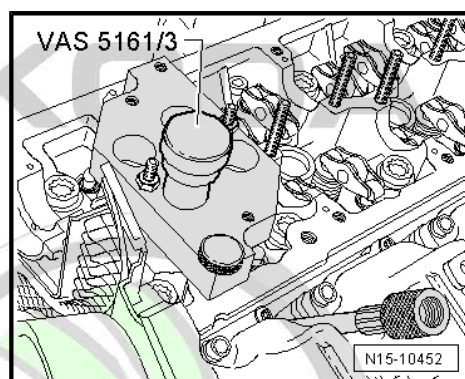
- Position the guide plate -VAS 5161/23- onto the cylinder head.
- Screw the guide plate to the side of the intake manifold with the knurled screw -VAS 5161/12- and to the stud bolt with 2 nuts M6 without collar -1- by hand until it fits on tightly.



- Screw the sealing bolt -VAS 5161/10- into the guide plate.
- Screw the adapter -VAS 5161/11 - into the relevant pencil type glow plug thread by hand.

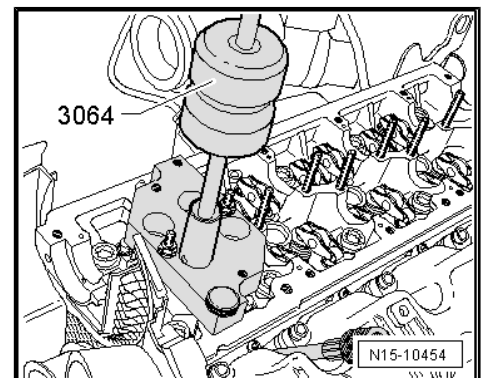
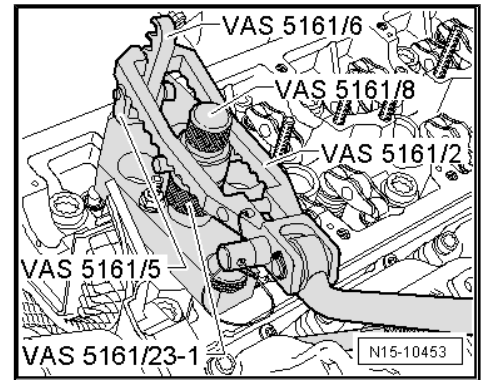


- Insert the impact drift -VAS 5161/3- into the guide plate and knock off the tightly fitted valve collets using a plastic hammer.

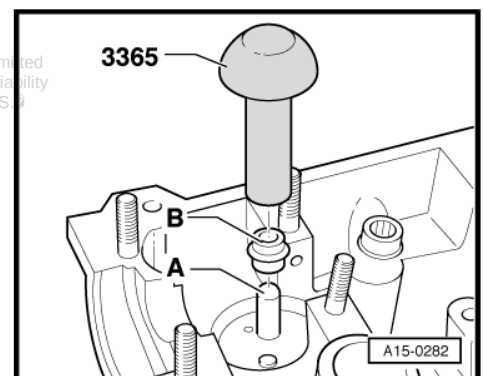


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- Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the guide plate.
- Slide the knurled spacer ring -VAS 5161/23-1- onto the assembly cartridge -VAS 5161/8-.
- Connect the adapter to the compressed air with a commercially available intermediate piece and apply constant pressure.
 - Minimum pressure: 0.6 MPa (6 bar) overpressure.
- Hook the pressure fork -VAS 5161/2- onto the detent part and push the assembly cartridge downwards.
- Turn simultaneously the knurled screw of the assembly cartridge to the right, until the tips click into the valve collets.
- Rotate the knurled screw to the left and to the right, by doing so the valve collets are pressed apart and are installed in the assembly cartridge.
- Release the pressure fork.
- Remove the assembly cartridge with the knurled spacer ring.
- Remove the valve spring with the valve spring retainer.
- Pull off valve stem seal with extractor for valve stem seal -3364-.

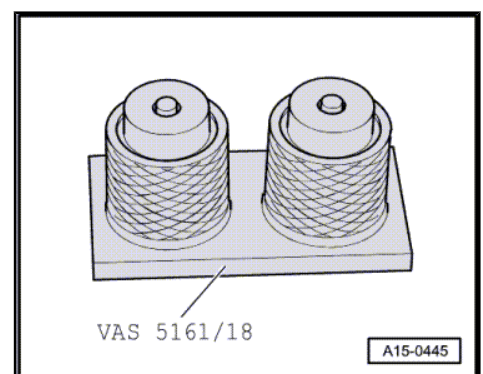


- Fit the plastic bushing -A-, which is attached to the new valve stem seals -B-, onto the valve stem.
- Lightly oil sealing lip of the new valve stem seal.
- Slide the valve stem seal onto the plastic bushing.
- Carefully press the valve stem seal with the valve stem seal insertion tool -3365- onto the valve guide.
- Remove plastic sleeve.



If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the insertion device for valve keys -VAS 5161/18-.

- The large diameter of the valve collets points to the top.
- Insert the valve spring and the valve spring retainer.
- Press the assembly cartridge from the top onto the insertion device for valve collets and lift up the valve collets.

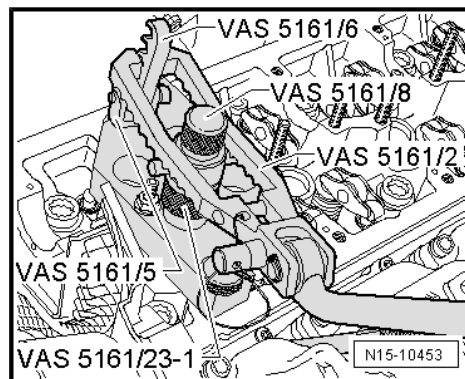


- Re-insert the assembly cartridge into the guide plate - VAS 5161/23 - .
- Press down the pressure fork and turn the knurled screw to the left and to the right while pulling it upwards, by doing so the valve collets are inserted.
- Release the pressure fork on tightened knurled screw.
- Repeat the procedure for each valve.

Assembling together

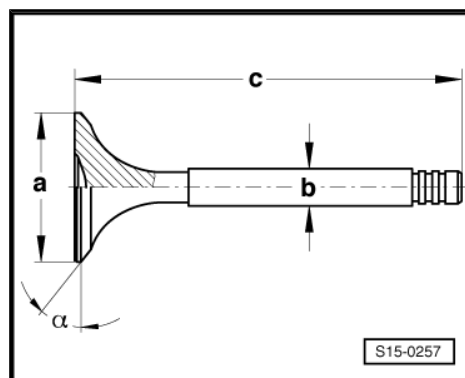
Installation is performed in the reverse order, pay attention to the following points:

- Ensure that all the roller arms are correctly positioned on the valve stem ends and are clipped in place on the relevant hydraulic balancing elements.
- Install camshafts ➔ [page 88](#) .
- Install glow plugs ➔ [page 214](#) .



2.5 Valve dimensions

Dimension		Inlet valve	Exhaust valve
Ø a	mm	26,60	26,00
Ø b	mm	5,975	5,965
c	mm	99,30	99,10
α	°	45	45



Note

Valves must not be reworked. Only grinding in is permissible.

2.6 Inspect valve guides

Special tools and workshop equipment required

- ♦ Universal dial gauge holder -MP 3-447 (VW 387)-
- ♦ Dial gauge

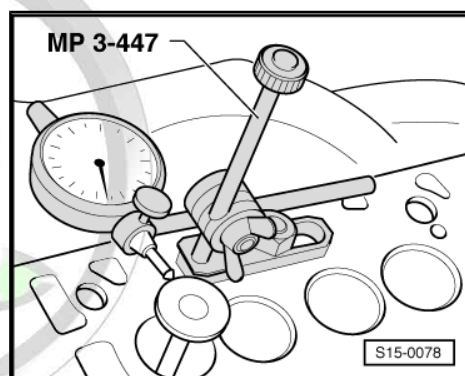
Test sequence



Note

If the valves are replaced when carrying out repair work, use new valves for the measurement.

- Insert valve into valve guide. End of valve stem must be flush with guide.
- Valve rock: max. 1.3 mm.



Note

If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be replaced.

17 – Lubrication

1 Removing and installing parts of the lubrication system



Note

- ◆ *If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries and additionally replace the engine oil cooler and the oil filter insert in order to avoid consequential damage.*
- ◆ *The oil level must not be above the max. marking - risk of damage to catalytic converter!*

Check the engine oil, amount of oil and oil specification ⇒ Maintenance ; Octavia II .

1 - 15 Nm

2 - Sprocket

- ☐ replace ⇒ [page 66](#)

3 - Dipstick

- ☐ The oil level must not exceed the MAX. marking

4 - Filler funnel

- ☐ The filler funnel and the guide pipe are one component part
- ☐ Tightening torque: ⇒ [page 99](#)

5 - Guide tube

- ☐ The filler funnel and the guide pipe are one component part
- ☐ Tightening torque: ⇒ [page 99](#)

6 - Oil injection nozzle

- ☐ for piston cooling
- ☐ removing and installing ⇒ [page 64](#)

7 - Pressure relief valve, 27 Nm

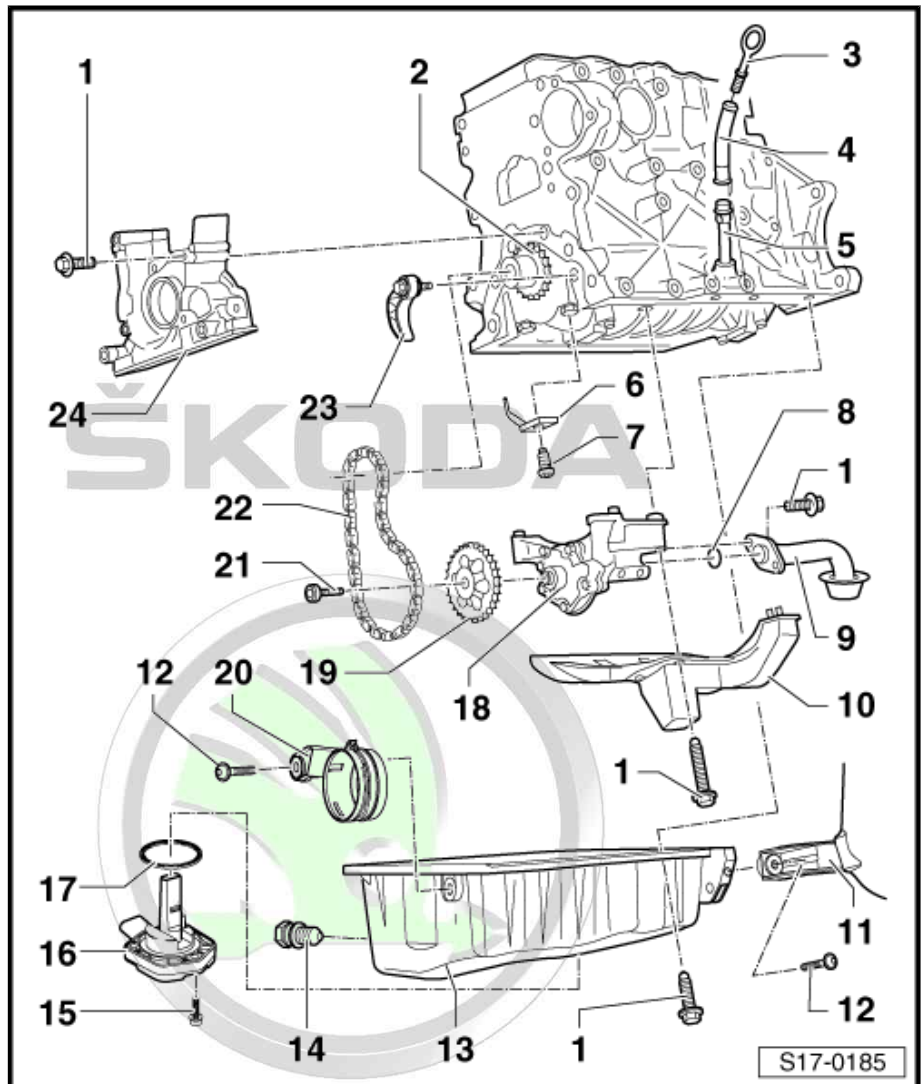
- ☐ opens at 0.25..0.32 MPa (2.5..3.2 bar) over-pressure
- ☐ replace without sealant
- ☐ removing and installing ⇒ [page 64](#)

8 - O-ring

- ☐ replace

9 - Intake manifold

- ☐ Clean strainer if dirty



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10 - Baffle

11 - Right charge air pipe

- ☐ suction side ➔ [page 167](#)

12 - 8 Nm

13 - Oil pan

- ☐ removing and installing ➔ [page 100](#)
- ☐ install with silicone sealant -D 176 404 A2-

14 - Drain plug, 30 Nm

- ☐ with gasket
- ☐ replace

15 - 10 Nm

- ☐ replace

16 - Oil level and oil temperature sender -G266 -

- ☐ check ➔ Vehicle diagnosis, testing and information system VAS 5051

17 - O-ring

- ☐ replace

18 - Oil pump

- ☐ with pressure relief valve 1.2 MPa (12 bar)
- ☐ removing and installing ➔ [page 103](#)
- ☐ before installing, check whether both dowel sleeves are present
- ☐ if there is any scoring on the contact surfaces of the gears, replace
- ☐ Tightening torque of oil pump cover at oil pump housing: 10 Nm

19 - Oil pump sprocket

- ☐ Fits onto oil pump shaft in one position only

20 - Right charge air pipe

- ☐ pressure side ➔ [page 167](#)

21 - 25 Nm

22 - Oil pump chain

- ☐ before removing mark running direction
- ☐ check for wear

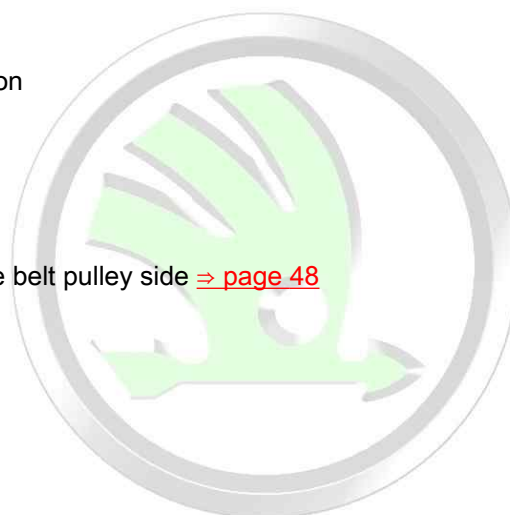
23 - Chain tensioner

- ☐ do not disassemble
- ☐ Replace chain tensioner if spring is broken.
- ☐ Check fitting position
- ☐ When installing, hook on the spring and pretension
- ☐ tighten to 16 Nm

24 - Sealing flange -on the belt pulley side-

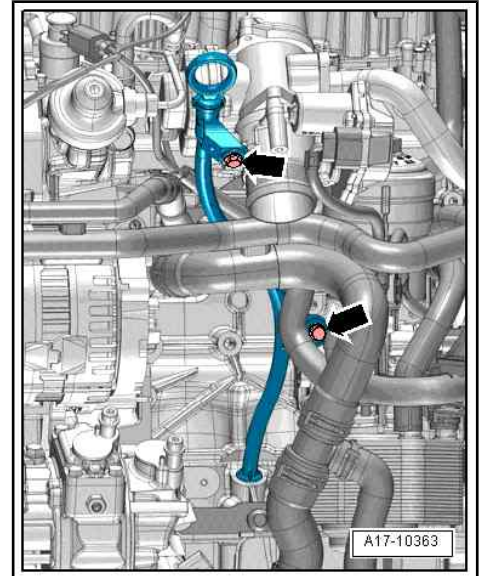
- ☐ must be positioned on dowel sleeves
- ☐ removing and installing ➔ [page 49](#)
- ☐ replace the gasket ring for the crankshaft - on the belt pulley side ➔ [page 48](#)

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Oil dipstick guide pipe - tightening torque

- Tighten screws -arrows- to 9 Nm.



1.1 Disassembling and assembling oil filter holder

1 - Screw plug - 25 Nm

2 - Gasket

- ☐ replace

3 - Engine oil cooler

- ☐ Pay attention to the information regarding a necessary replacement ➔ [page 97](#)
- ☐ connection diagram for coolant hoses ➔ [page 108](#)

4 - Gasket

- ☐ replace
- ☐ Fitting position ➔ [page 100](#)

5 - 15 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ tighten crosswise

6 - Oil filter holder

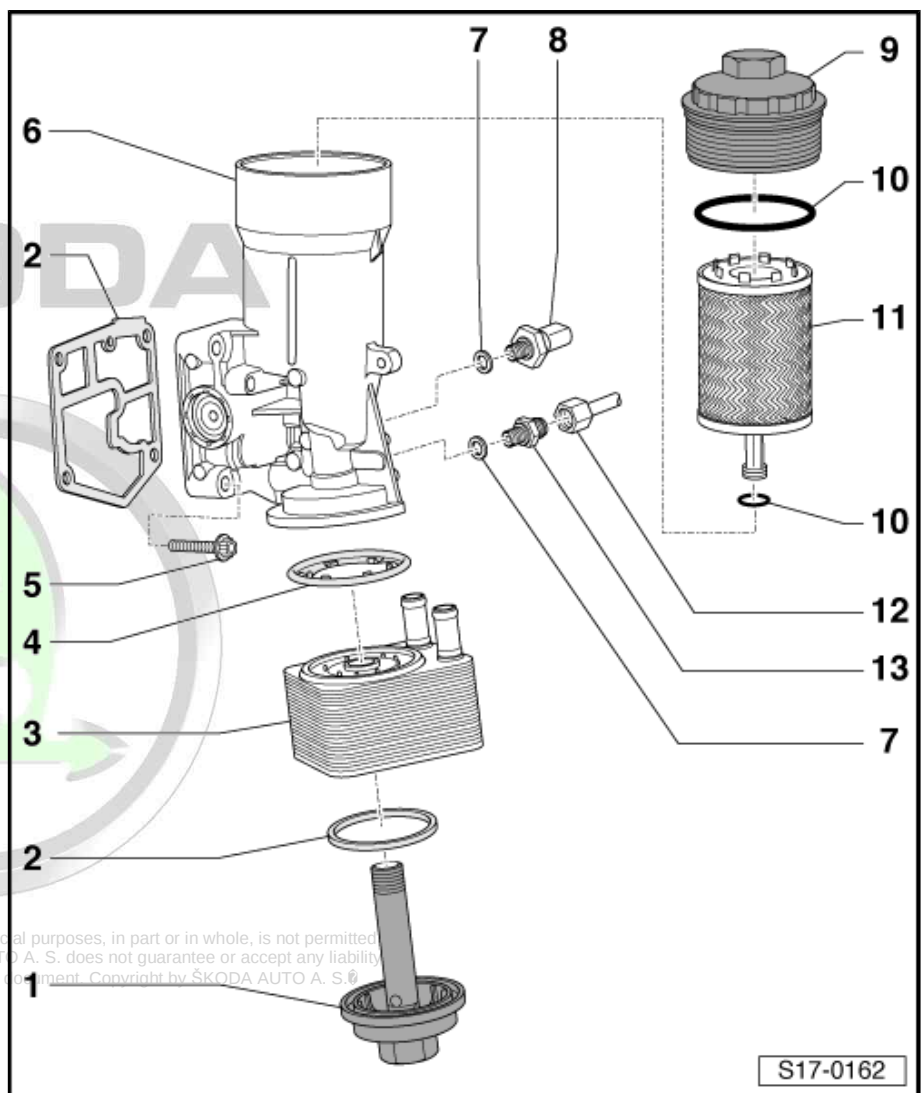
- ☐ with oil retaining valve
- ☐ the oil retaining valve cannot be replaced individually
- ☐ removing and installing ➔ [page 103](#)

7 - Sealing ring

- ☐ replace

8 - Oil pressure switch -F1-- 22 Nm

- ☐ Identification: brown
- ☐ 0.07 MPa (0.7 bar) switch
- ☐ removing and installing



S17-0162

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- ☐ check ⇒ [page 106](#)

9 - Screw cap - 25 Nm

- ☐ slacken and tighten with oil filter wrench -3417-

10 - O-ring

- ☐ replace

11 - Oil filter element

- ☐ pull off cap (Pos. 9)
- ☐ when replacing oil filter element replace O-rings (Pos. 10)
- ☐ Check fitting position
- ☐ pay attention to change intervals ⇒ Maintenance ; Octavia II

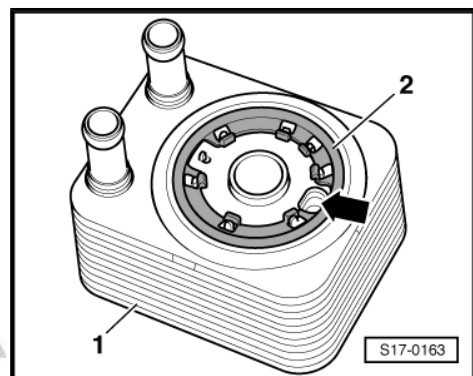
12 - Oil feed line

- ☐ to exhaust gas turbocharger
- ☐ Observe the mounting sequence:
 - Screw on the union nuts first of all by hand.
 - Then tighten the union nuts to 22 Nm.
 - Subsequently secure the oil feed line in the brackets.

13 - Connection fittings - 30 Nm

Fitting position of gasket for engine oil cooler

- Place the gasket -2- in such a way that it can be pressed onto all the lugs of the engine oil cooler -1-.
- The oil duct -arrow- must not be covered from the gasket.



1.2 Removing and installing oil pan

Special tools and workshop equipment required

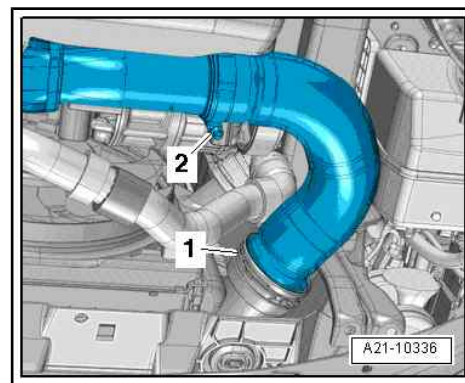
- ◆ Socket insert -T10058-
- ◆ Silicone sealant -D 176 404 A2-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Protective goggles and gloves

Removing

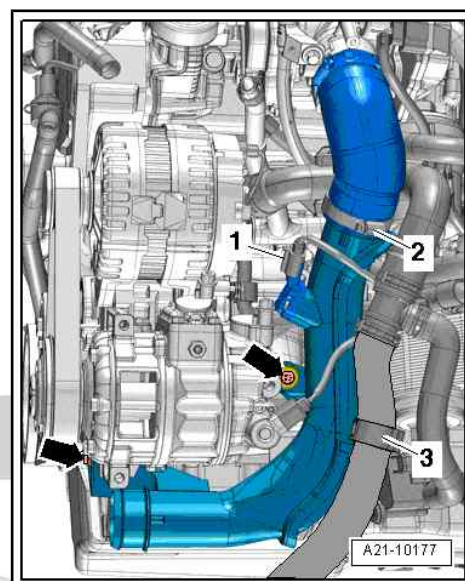
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the right wheelhouse liner bottom part ⇒ Body Work; Rep. Gr. 66 .

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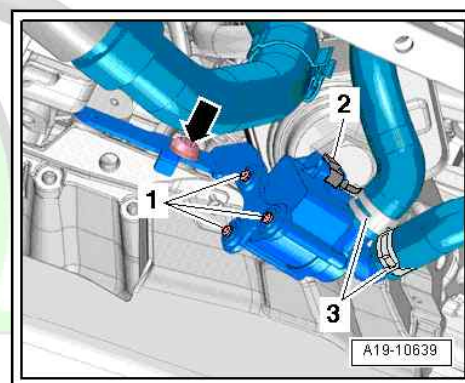
- Remove the right charge air hose, to do so loosen the hose clamp -2- and raise the retaining clip -1-.



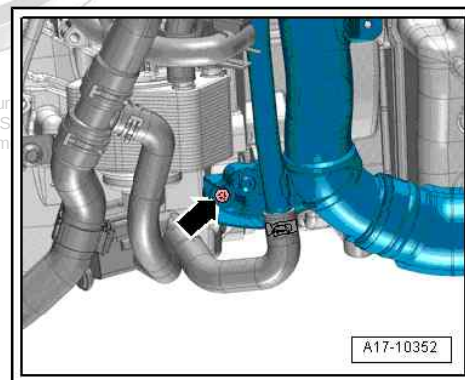
- Unscrew screws -arrows-, push the right charge air pipe slightly to the side and secure.



- Unscrew screw -arrow- and push the coolant recirculation pump 2 -V178- to the side.



- Unscrew screw -arrow- on the left charge air pipe.
- Disconnect plug at oil level and oil temperature sender - G266- .



- Drain engine oil ⇒ Maintenance ; Octavia II.

- Unscrew the bolts of oil pan/gearbox -arrows-.
- Loosen bolts -1...20- crosswise and release.
- Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.

Install

Installation is performed in the reverse order, pay attention to the following points:



WARNING

Wear protective gloves when working with sealant and grease remover!

- Remove residual sealant from the sealing surfaces on the cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).
- Apply silicone sealant bead -D 176 404 A2- -arrow- to the clean sealing surface of the oil pan, as shown.
- Thickness of sealant bead: 2...3 mm.



Note

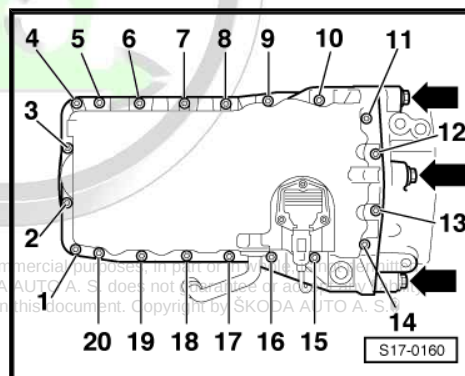
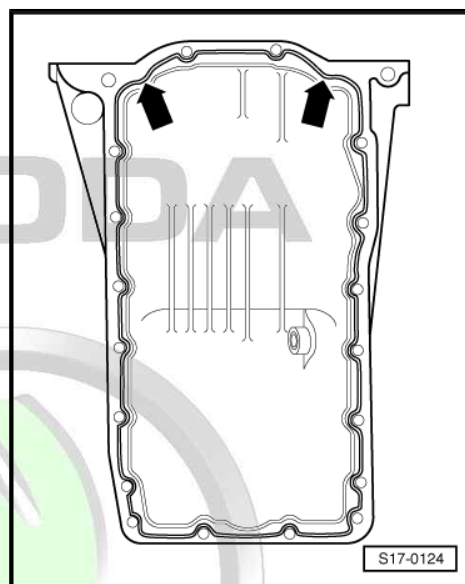
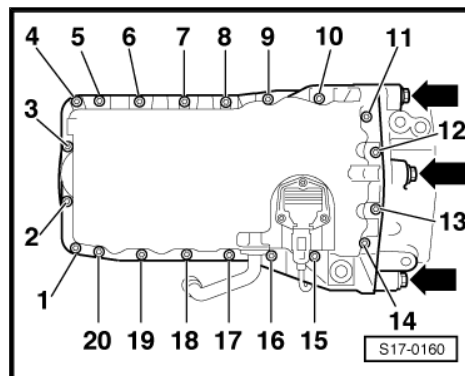
- ♦ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clogg the strainer in the oil suction pipe.*
- ♦ *Take particular care when applying the sealant bead in the area of the sealing flange -gearbox side- -arrows-.*
- ♦ *The oil pan must be installed within 5 minutes after applying the silicone sealant -D 176 404 A2- .*

- Fit on oil pan immediately and tighten the bolts as follows:
- First of all pre-tighten bolts -1...20- crosswise to 5 Nm.
- Tighten the bolts of the oil pan/gearbox -arrows- to a torque of 40 Nm.
- Tighten screws -1...20- crosswise to 15 Nm.



Note

- ♦ *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- ♦ *After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*
- Fill with engine oil and check the oil level ⇒ Maintenance ; Octavia II .



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1.3 Removing and installing oil pump

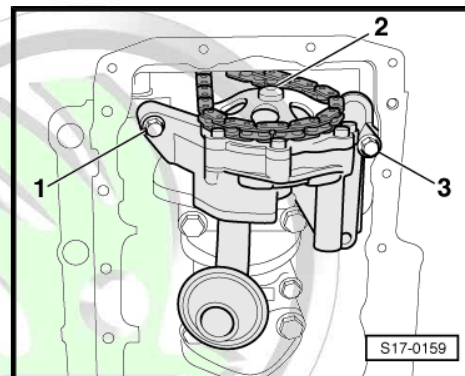
Removing

- Removing the oil pan ➔ [page 100](#) .
- Remove baffle ➔ [page 97](#) .
- Release screw -2-.
- Pull the chain sprocket off the oil pump shaft.
- Release screws -1- and -3- and remove oil pump.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Insert top dowel sleeves into the oil pump.
- Installed position of the oil pump shaft/chain sprocket: Chain sprocket fits onto the shaft in one position only.
- Installing the oil pan ➔ [page 100](#) .



1.4 Removing and installing oil pressure switch -F1-

Special tools and workshop equipment required

- ◆ Assembly tool -T10118-

Removing

- Remove the air filter housing ➔ [page 196](#) .
- Disconnect the plug -1- at the oil pressure switch -F1- using the assembly tool -T10118- .
- Unscrew oil pressure switch -F1- -2-.

Install

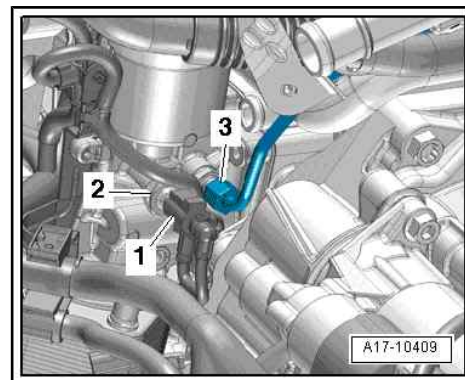
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace gasket ring.

- ◆ Tightening torque: ➔ [page 99](#)



1.5 Removing and installing the oil filter holder with the engine oil cooler

Special tools and workshop equipment required

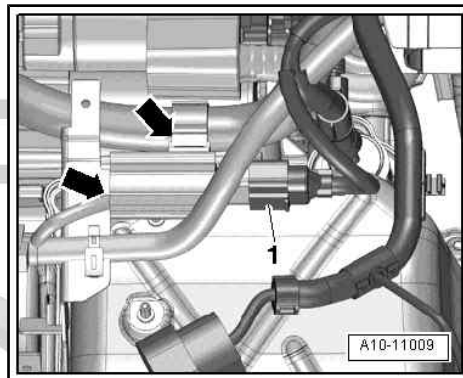
- ◆ Assembly tool -T10118-
- ◆ Catch pan for oil

Removing

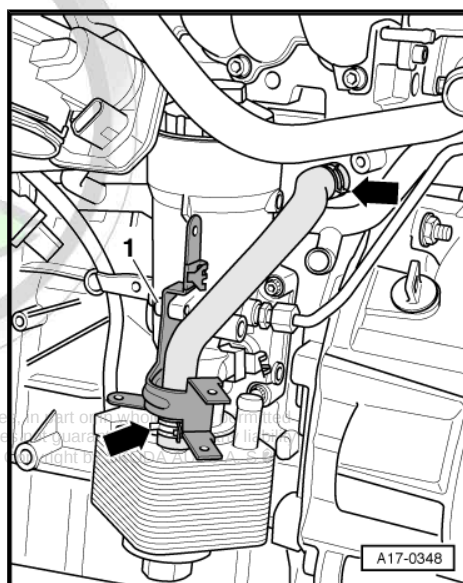
- Drain coolant ➔ [page 111](#) .
- Remove the air filter housing ➔ [page 196](#) .
- Remove fan shroud with radiator ➔ [page 132](#) .



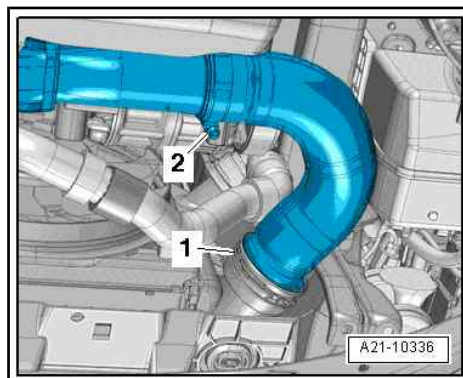
- Expose the wiring looms -arrows- and the electrical plug connection -1- on the bracket and on the left charge air pipe.



- Remove screw -1- and wiring loom bracket.
- Remove the coolant hose from the engine oil cooler, to do so slacken the hose clamp -bottom arrow-.



- Remove the right charge air hose, to do so loosen the hose clamp -2- and raise the retaining clip -1-.

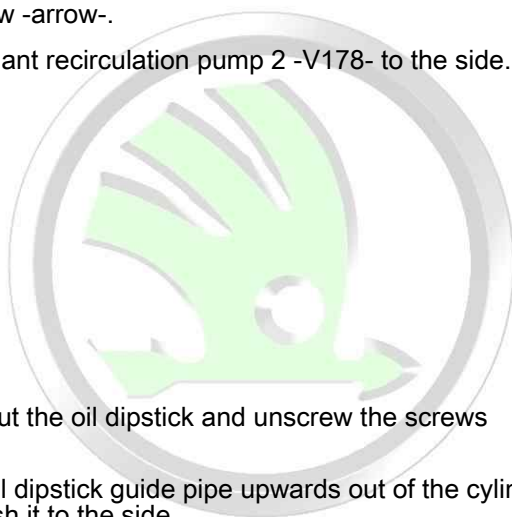


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- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.

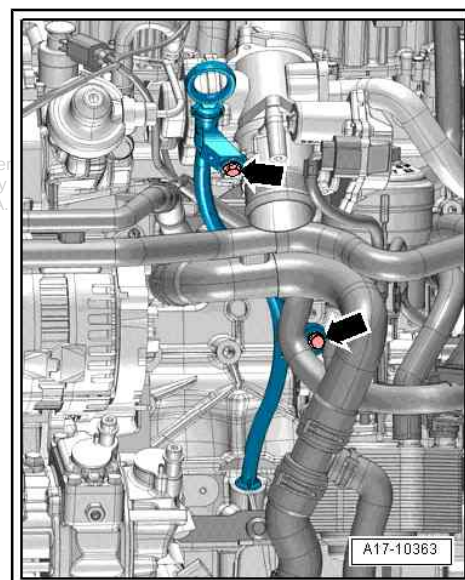
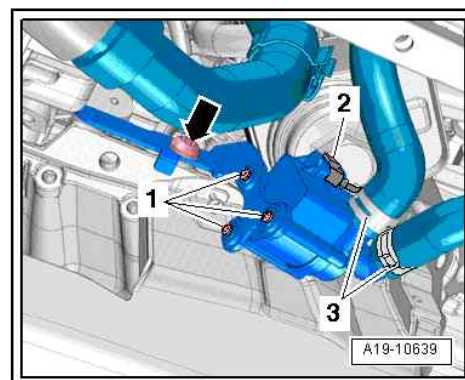
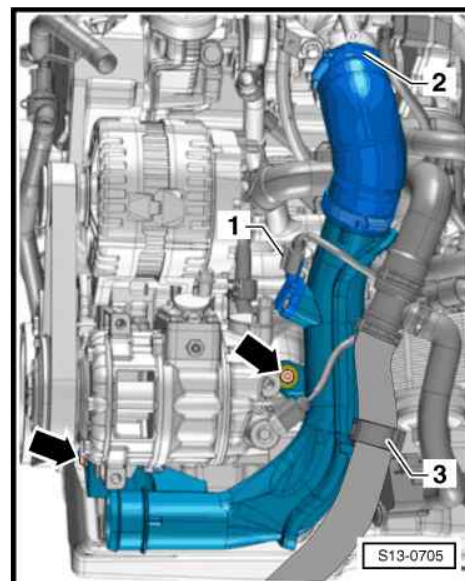
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- Release screw -arrow-.
- Push the coolant recirculation pump 2 -V178- to the side.

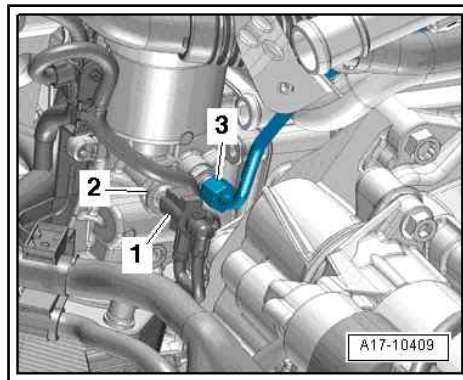


- Slightly pull out the oil dipstick and unscrew the screws -arrows-.
- Pull out the oil dipstick guide pipe upwards out of the cylinder block and push it to the side.

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- Disconnect the plug -1- at the oil pressure switch -F1- using the assembly tool -T10118- .
- Unscrew oil pressure switch -2-.
- Unscrew the oil feed line from the connection on the oil filter holder, to do so counterhold on the hexagon using an open-end wrench and slacken the union nut -3-.
- Place a catch pan for oil under the engine.



- Release screws -arrows- and remove oil filter holder.

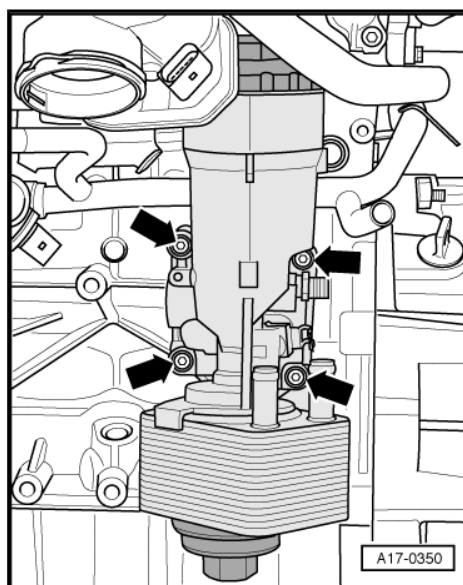
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ Replace gaskets, gasket rings and O-rings.
- ◆ Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.
- ◆ For this step, observe the assembly instruction for hose connections with push-fit couplings ➔ [page 169](#) .
- ◆ Tightening torques: ➔ [page 99](#)
- Install the oil dipstick guide pipe ➔ [page 99](#) .
- Checking the oil level ➔ Maintenance ; Octavia II .
- Top up or change coolant if the engine oil cooler was replaced ➔ [page 111](#) .



1.6 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

- ◆ Oil pressure tester , e.g. - V.A.G 1342-
- ◆ Voltage tester , e. g. -V.A.G 1527 B -
- ◆ Measuring tool set , e.g. -V.A.G 1594 C -

Test conditions

- Oil level o.k.
- Coolant temperature approx. 80°C

Test preparations

- Remove oil pressure switch -F1- ➔ [page 103](#)
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- Screw the connection of the oil pressure tester -V.A.G 1342- into the hole for the oil pressure switch.
- Screw the oil pressure switch -2- into the oil pressure tester.

Testing oil pressure switch

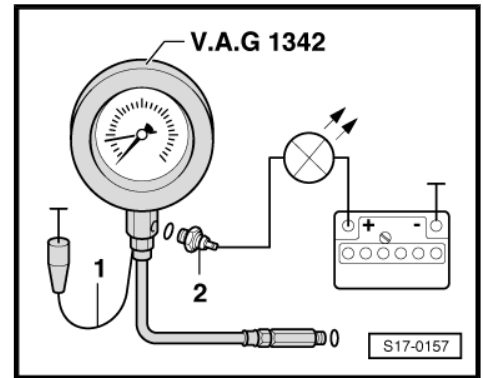
- Connect brown cable -1- of oil pressure tester to earth (-).
- Unclamp the voltage tester with its auxiliary cables out of the measuring tool set on the oil pressure switch and plus (+) terminal on the battery.
- The LED should not light up.

If the LED lights up:

- Replace oil pressure switch.

If the LED does not light up:

- Start engine.



Note

Observe the testing equipment and the LED while actuating the starter since the switching point of the oil pressure switch can already be exceeded when starting up.

- At 0.055...0.085 MPa (0.55...0.85 bar) the LED should light up.

If the LED does not light up:

- Replace oil pressure switch.

Testing oil pressure

- Start engine.
- Oil pressure when engine idling: at least 0.08 MPa (0.8 bar).
- Oil pressure at a speed of 2000 rpm: at least 0.2 MPa (2.0 bar).

If the specified values are not reached: Oil pump defective.

- Replace oil pump ➔ [page 103](#).

- Oil pressure at a higher engine speed: max. 0.7 MPa (7.0 bar).

If the specified value is exceeded: Pressure relief valve defective.

- Replace oil filter holder ➔ [page 103](#).



19 – Cooling

1 Cooling system



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.



Note

- ◆ *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- ◆ *Secure all hose connections with corresponding hose clips.*
- ◆ *Use pliers for spring strap clamps to fit the spring strap clips.*
- ◆ *Always replace seals and gasket rings.*
- ◆ *The arrows affixed to the coolant pipes and the coolant hoses must stand opposite to each other.*

1.1 Connection diagram for coolant hoses for vehicles manufactured up to 08.09

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1 - Expansion reservoir

- ☐ with cap
- ☐ Testing the pressure relief valve in the cap
⇒ [page 134](#)

2 - Radiator for exhaust gas recirculation

- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)
- ☐ removing and installing ⇒ [page 211](#)

3 - to auxiliary heating system

4 - from the auxiliary heating system

5 - Cylinder block

- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)

6 - Heat exchanger for heating

- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)

7 - Throttle

- ☐ integrated into the coolant hose, not visible from the outside
- ☐ The fitting position is not defined, therefore the coolant hose must not be unclipped with the hose clamps (Risk of damage!)

8 - ATF radiator

- ☐ only for vehicles with automatic gearbox

9 - Left coolant hose

10 - Engine oil cooler

- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)
- ☐ removing and installing ⇒ [page 99](#)

11 - Coolant recirculation pump 2 -V178-

- ☐ removing and installing ⇒ [page 124](#)

12 - Radiator

- ☐ removing and installing ⇒ [page 132](#)
- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)

13 - Right coolant hose

14 - Coolant temperature sender at radiator outlet -G83-

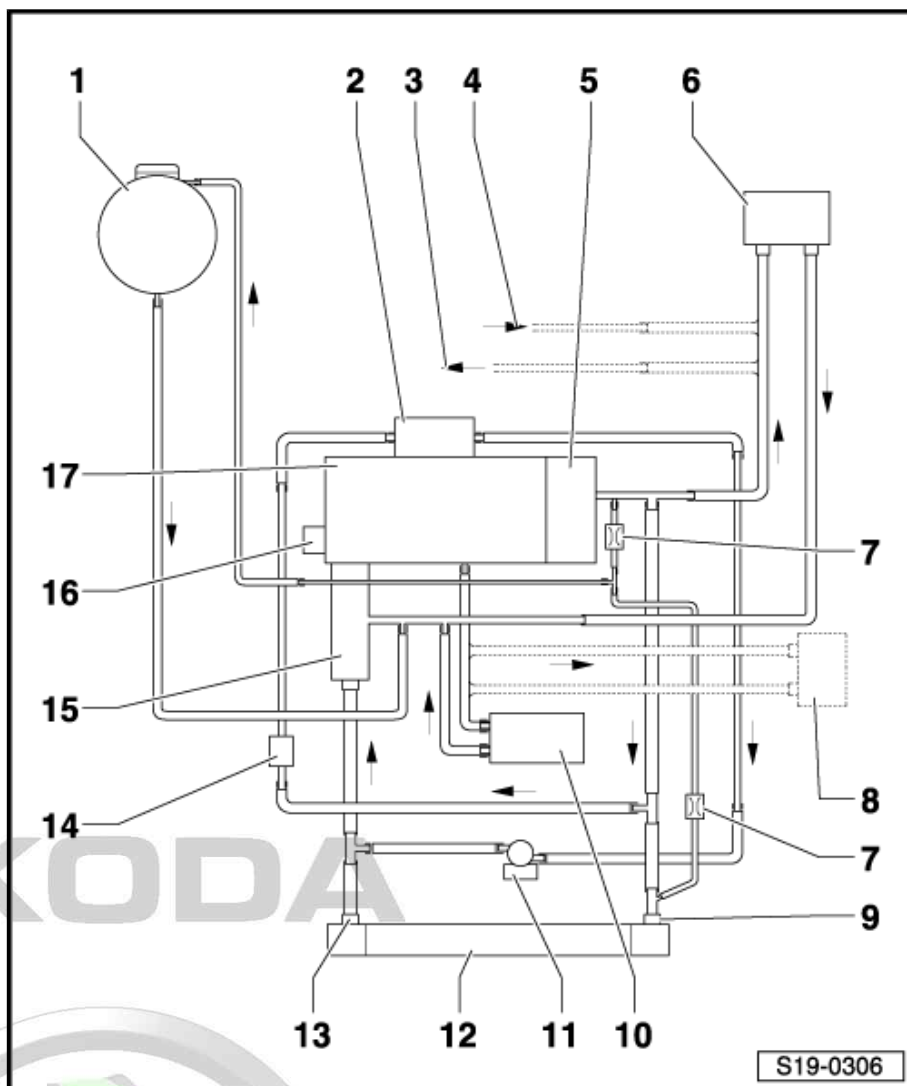
- ☐ replace ⇒ [page 123](#)

15 - Coolant regulator

- ☐ removing and installing ⇒ [page 116](#)

16 - Coolant pump

- ☐ removing and installing ⇒ [page 115](#)



17 - Cylinder head

- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)

1.2 Connection diagram for coolant hoses for vehicles manufactured as of 08.09

1 - Expansion reservoir

- ☐ with cap
- ☐ Testing the pressure relief valve in the cap ➔ [page 134](#)

2 - Radiator for exhaust gas recirculation

- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)
- ☐ removing and installing ➔ [page 211](#)

3 - to auxiliary heating

4 - from the auxiliary heating

5 - Cylinder block

- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)

6 - Heat exchanger for heating

- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)

7 - Throttle valve

- ☐ integrated into the coolant hose, not visible from the outside
- ☐ The fitting position is not defined, therefore the coolant hose must not be unclipped with the hose clamps (Risk of damage!)

8 - ATF radiator

- ☐ only for vehicles with automatic gearbox

9 - Engine oil cooler

- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)
- ☐ removing and installing ➔ [page 99](#)

10 - Coolant recirculation pump 2 -V178 -

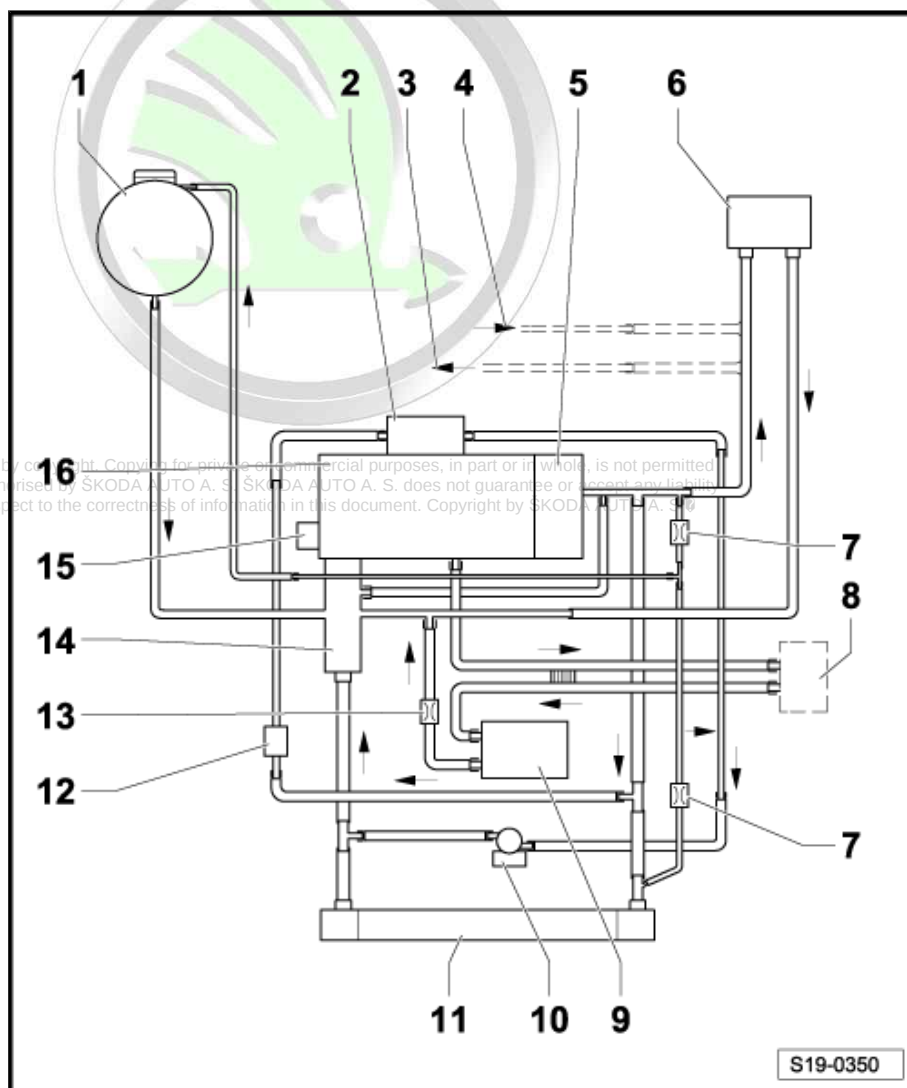
- ☐ removing and installing ➔ [page 124](#)

11 - Radiator

- ☐ removing and installing ➔ [page 132](#)
- ☐ after replacing fill entire system with fresh coolant ➔ [page 111](#)

12 - Coolant temperature sender at radiator outlet -G83-

- ☐ replace ➔ [page 123](#)





13 - Throttle valve

- ☐ only for vehicles with manual gearbox
- ☐ integrated into the coolant hose, not visible from the outside
- ☐ The fitting position is not defined, therefore the coolant hose must not be unclipped with the hose clamps (Risk of damage!)

14 - 4/2 way valve with coolant regulator

- ☐ removing and installing ⇒ [page 116](#)

15 - Coolant pump

- ☐ removing and installing ⇒ [page 115](#)

16 - Cylinder head

- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)

1.3 Draining and filling up coolant

Special tools and workshop equipment required

- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps
- ◆ antifreeze tester

Draining



Note

Collect drained coolant in a clean container for proper disposal or reuse.



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

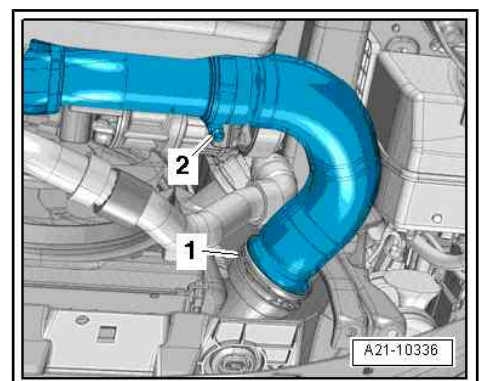
- Open the cap of the coolant expansion reservoir.
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the right charge air hose, to do so loosen the hose clamp -2- and raise the retaining clip -1-.



WARNING

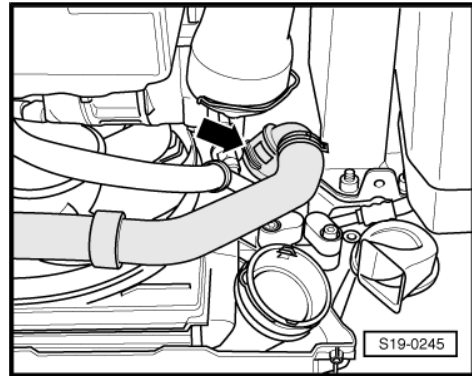
Shut off the opening of the charge air cooler, e.g. with a clean foam piece, so that no coolant can penetrate.

- Place a catch pan under the engine.

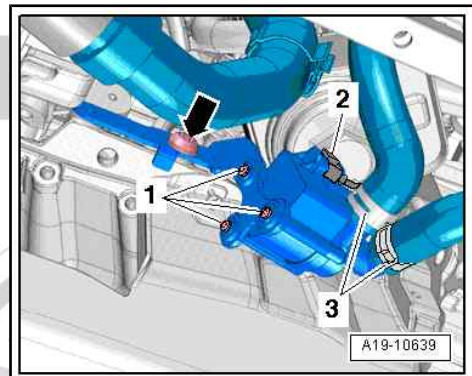




- Remove the right coolant hose from the radiator; to do so pull the retaining clip -arrow-.



- Remove the coolant hoses -3- at the coolant recirculation pump 2 -V178- .
- Remove the air filter housing ➔ [page 196](#) .



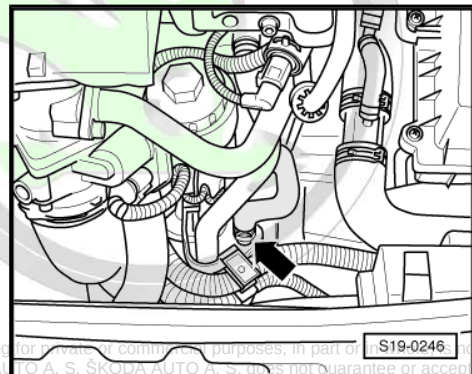
- Remove the rear coolant hose on the engine oil cooler -arrow- and drain residual coolant.

Filling up



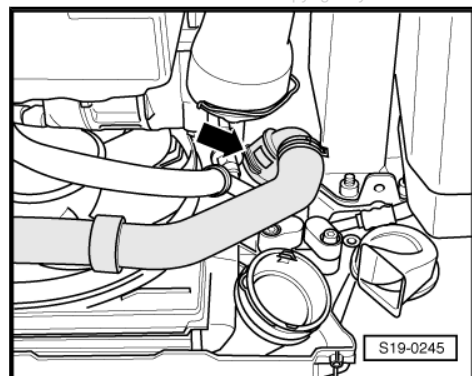
Note

Replace O-rings.



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- Connect coolant hose on the right of radiator -arrow-.



- Connect the coolant hoses -3- at the coolant recirculation pump 2 -V178- .

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- Connect the rear coolant hose on the engine oil cooler -arrow-.

Select the appropriate coolant additive from the Electronic Catalogue of Original Parts Škoda or from the list of allowed coolant additives ⇒ Maintenance ; Octavia II .

- In a clean reservoir mix water and coolant additive in the specified mixing ratio ⇒ Maintenance ; Octavia II .

- Top up coolant in the expansion reservoir, until the maximum marking of the coolant level is reached.

Switch off the heating and air-conditioning system.

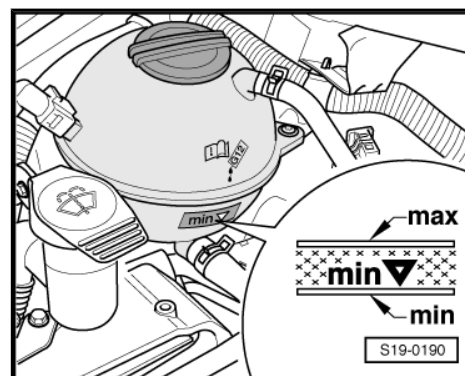
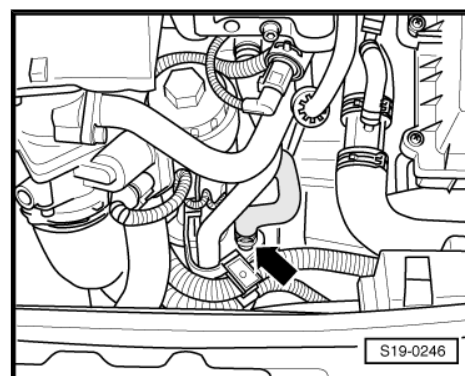
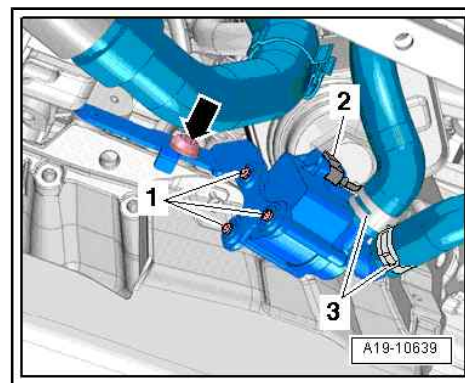
- Start engine, run for not more than 2 minutes at approx. 1500 rpm and while doing so top up coolant in the expansion reservoir.
- Tighten cap at expansion reservoir.
- Run engine until radiator fan starts.



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

- Check the level of coolant when the expansion reservoir is closed and top up if necessary when the engine is cooled down.
- When engine is at operating temperature the coolant level must be at the maximum marking, when engine is cold between the minimum and the maximum markings.



2 Coolant pump and coolant regulator

2.1 Coolant pump and coolant regulator for vehicles manufactured up to 08.09 - Summary of components

1 - Coolant pump
❑ removing and installing
⇒ [page 115](#)

2 - 15 Nm

3 - O-ring
❑ replace

4 - Coolant regulator
❑ removing and installing

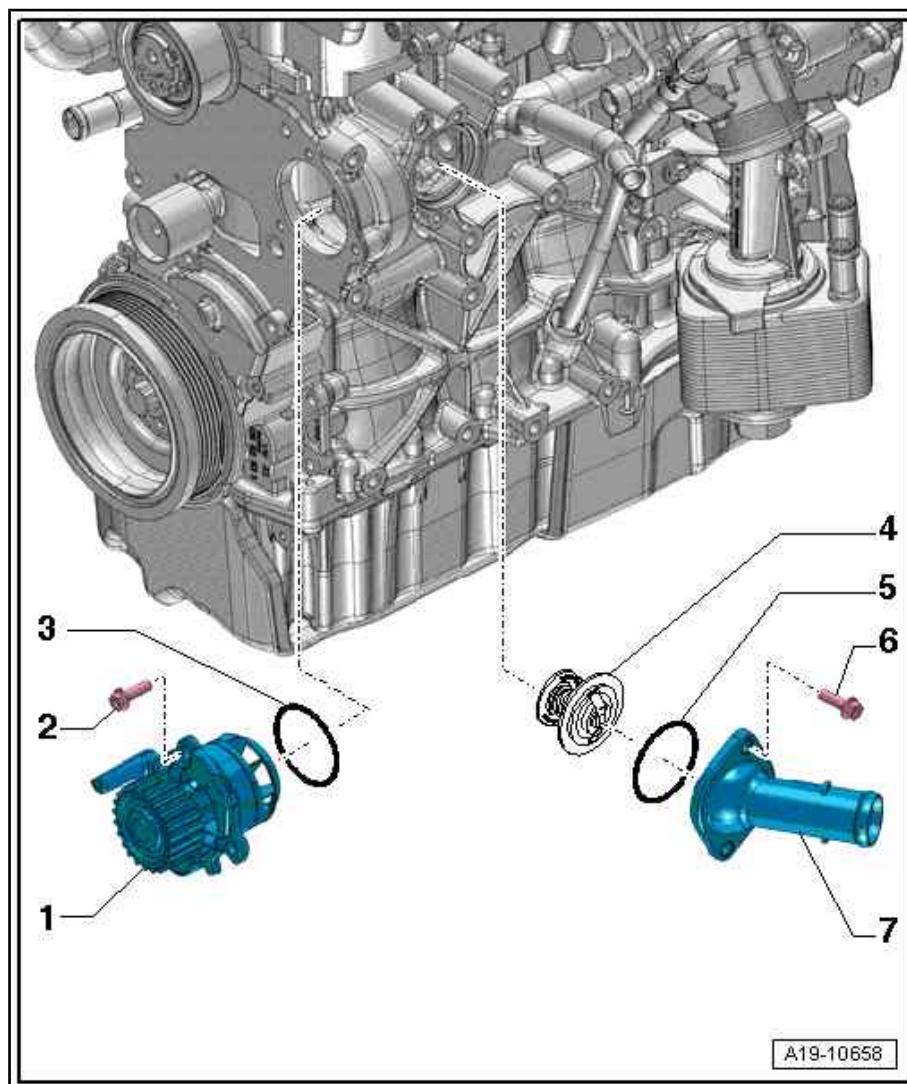
⇒ [page 116](#)

❑ check ⇒ [page 120](#)

5 - O-ring
❑ replace

6 - 15 Nm

7 - Connection fittings



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2.2 Coolant pump and 4/2 way valve with coolant regulator for vehicles manufactured as of 08.09 - Summary of components

1 - Coolant pump

- ☐ removing and installing
⇒ [page 115](#)

2 - 15 Nm

3 - O-ring

- ☐ replace

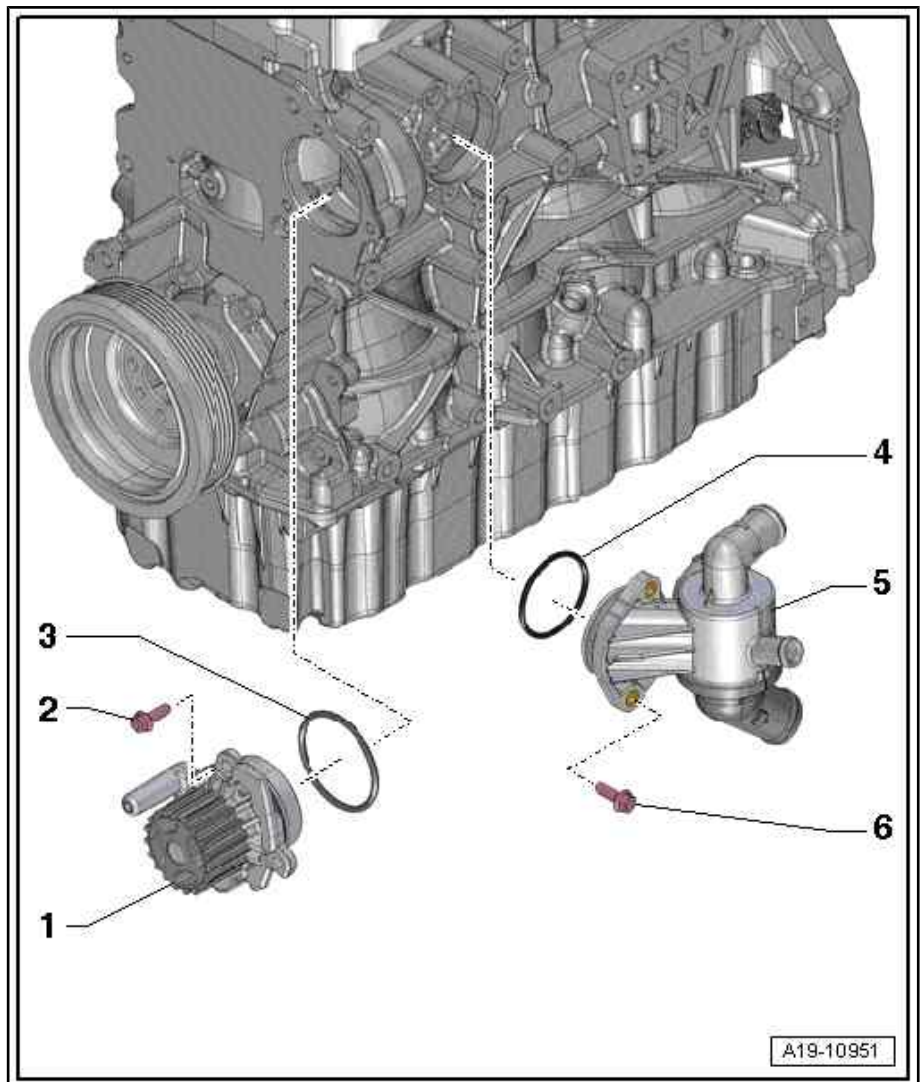
4 - O-ring

- ☐ replace

5 - 4/2 way valve with coolant regulator

- ☐ The coolant regulator is integrated in the 4/2 way valve and cannot be replaced separately
- ☐ removing and installing
⇒ [page 118](#)
- ☐ Testing coolant thermostat ⇒ [page 120](#)

6 - 15 Nm



2.3 Removing and installing coolant pump

Removing

- Drain coolant ⇒ [page 111](#) .
- Removing toothed belt ⇒ [page 37](#) .

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- Release screws -1- and remove coolant pump -2-.
- Remove O-ring -3-.

Install

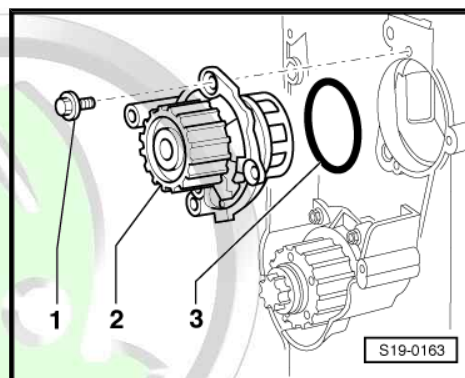
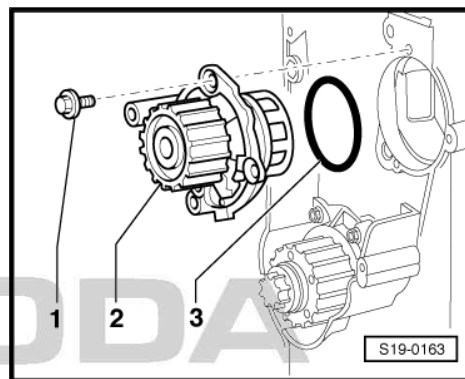
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace O-ring.

- Clean sealing surface for O-ring, if necessary smoothen.
- Moisten new O-ring -3- with coolant.
- Attach the coolant pump -2-.
- Fitting position: Plug in housing points down.
- Tighten screws -1- of coolant pump to 15 Nm.
- Installing the timing belt ➔ [page 42](#) .
- Top up coolant ➔ [page 111](#) .



2.4 Removing and installing coolant regulator for vehicles manufactured up to 08.09

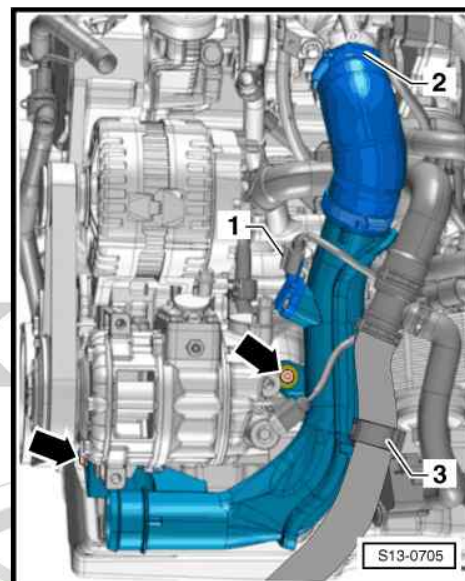
Special tools and workshop equipment required

- ◆ Flexible-head wrench SW 10 -3185-
- ◆ Socket insert -T10058-
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps

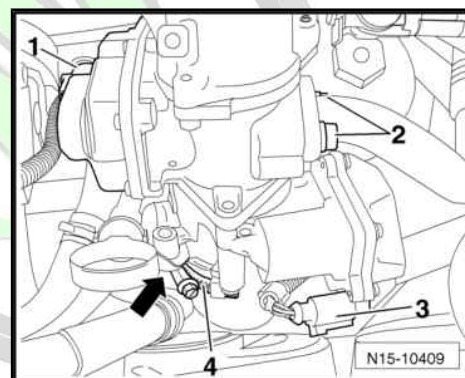
Removing

- Drain coolant ➔ [page 111](#) .
- Remove fan shroud with radiator fans ➔ [page 132](#) .

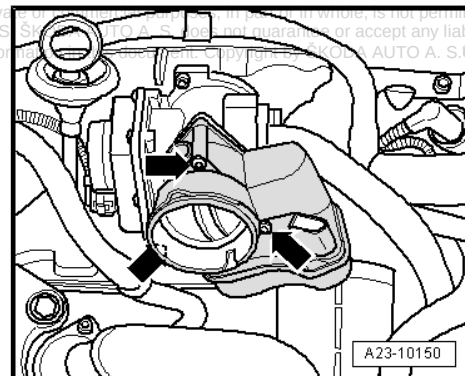
- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.



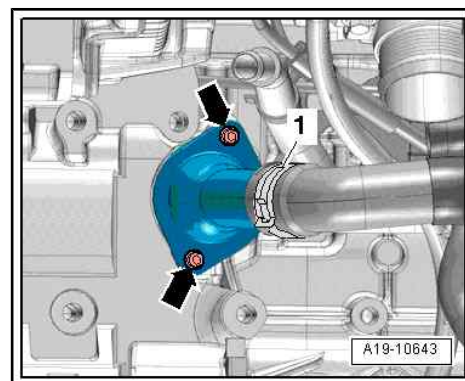
- Disconnect the plug -3- from the throttle valve control unit -J338- .
- Release the screw -arrow- on the oil dipstick guide pipe.



- Release screws -arrows- and remove throttle valve control unit -J338- .



- Remove the coolant hose from the connection fitting, to do so slacken the hose clamp -1-.
- Slacken the screws -arrows- using the flexible-head wrench -3185- , screw out with socket insert -T10058 - and remove the connection fitting.



- Turn coolant thermostat -2- approx. 90° (1/4 turn) anti-clockwise -arrow- and remove from connection fitting.
- Remove O-ring -1-.

Install

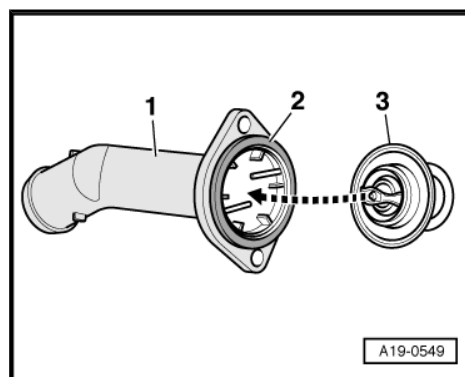
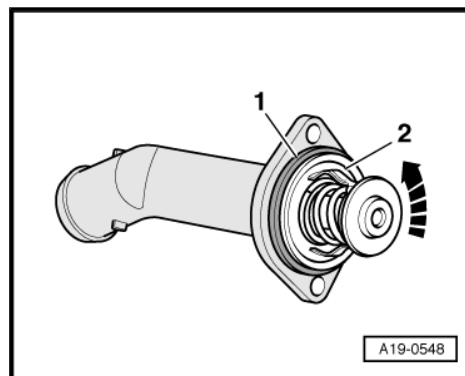
Installation is performed in the reverse order, pay attention to the following points:



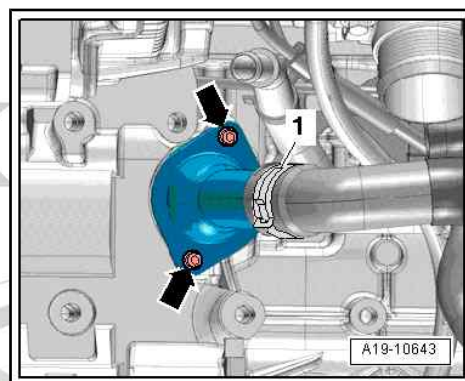
Note

Replace O-ring.

- Clean sealing surface for O-ring, if necessary smoothen.
- Insert the coolant regulator -3- with the O-ring -2-.
- Moisten O-ring -2- with coolant.



- Position the connection fitting at the cylinder block and tighten the screws -arrows- to 15 Nm.
- Top up coolant ⇒ [page 111](#) .



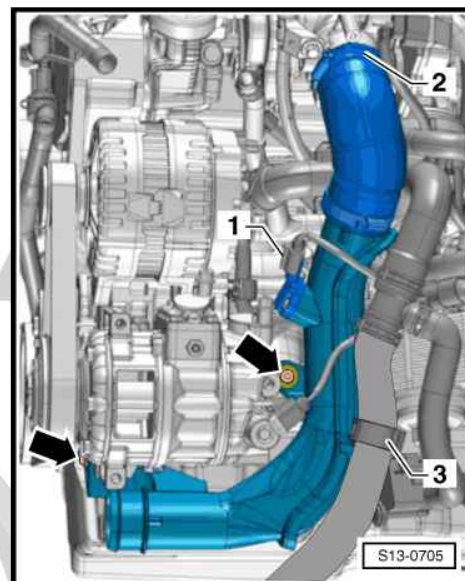
2.5 Removing and installing 4/2 way valve with coolant regulator for vehicles manufactured as of 08.09

Special tools and workshop equipment required

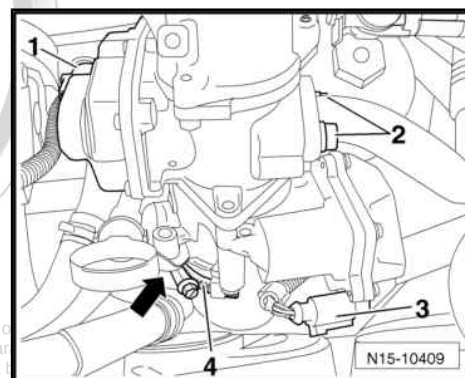
- ◆ Pliers for spring strap clamps
- Drain coolant ⇒ [page 111](#) .
- Remove the generator ⇒ Electrical System; Rep. Gr. 27 .

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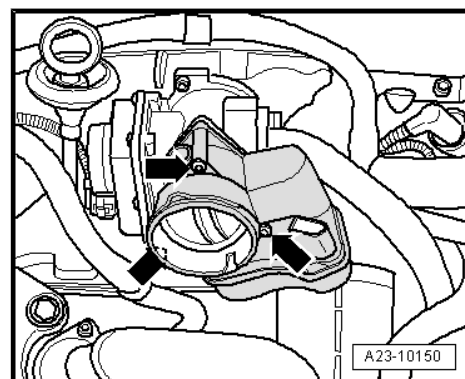
- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.



- Disconnect the plug -3- from the throttle valve control unit -J338- .
- Release the screw -arrow- on the oil dipstick guide pipe.



- Release screws -arrows- and remove throttle valve control unit -J338- .



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- Detach the coolant hoses from the connection fittings -A,B and D-.
- Release fixing screws -3- for 4/2 way valve with coolant regulator -2-.
- Remove the 4/2 way valve with coolant regulator from the cylinder block and then pull it to the left in order to separate the connection fitting -C- from the front coolant pipe.

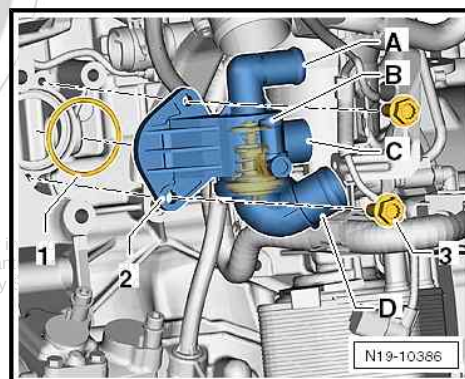
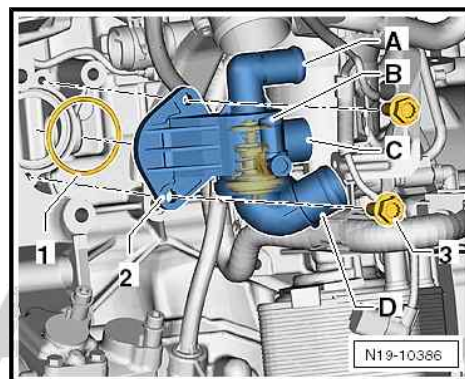
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ Replace O-ring.
- ◆ Hose connections as well as pipes and hoses for charge air system must be free of oil and grease before being installed.
- ◆ Observe the instructions for installing the charge air hoses ⇒ [page 169](#).
- ◆ Secure all hose connections with prescribed hose clamps ⇒ *Electronic Catalogue of Original Parts*.
- First of all position the 4/2 way valve with coolant regulator with the connection fitting -C- on the front coolant pipe and subsequently insert it into the cylinder block.
- Screw in fixing screws -3- for 4/2 way valve with coolant regulator -2-.
- ◆ Tightening torque: 15 Nm
- Connect the coolant hoses to the connection fittings -A,B and D-.
- Top up coolant ⇒ [page 111](#).



2.6 Testing coolant thermostat

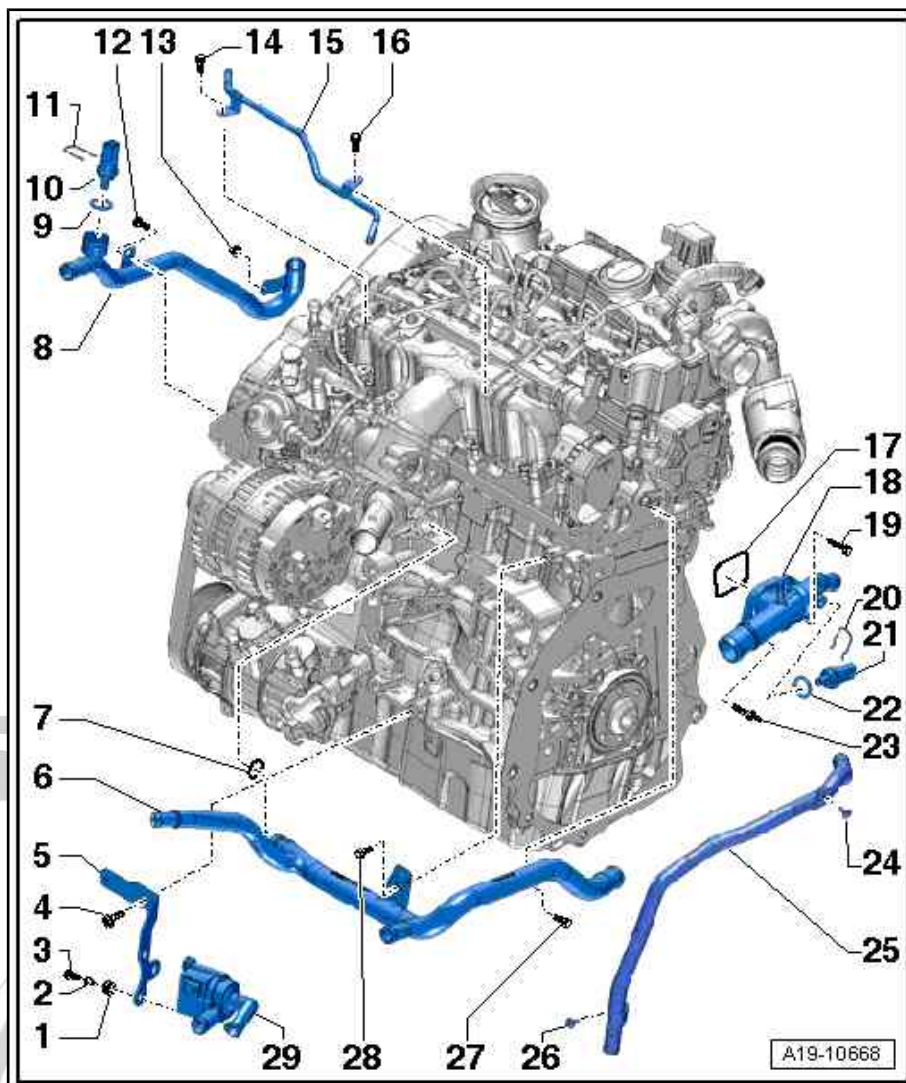
- Heat up the removed coolant regulator in a water bath.

Start of opening	End of opening	Opening stroke
approx. 87 °C	approx. 102 °C ¹⁾	min. 7 mm
◆ ¹⁾ Cannot be tested.		

3 Coolant pipes, coolant temperature sender, coolant recirculation pump

3.1 Coolant pipes, coolant temperature sender, coolant recirculation pump - Summary of components

- 1 - Grommet
 - ☐ not available separately
- 2 - Bushing
 - ☐ not available separately
- 3 - 3 Nm
- 4 - 40 Nm
- 5 - Support
 - ☐ Coolant recirculation pump 2 -V178-
- 6 - Front coolant pipe
 - ☐ removing and installing
⇒ [page 125](#)
- 7 - O-ring
 - ☐ replace
- 8 - Coolant pipe on the right
 - ☐ removing and installing
⇒ [page 129](#)
- 9 - O-ring
 - ☐ replace
- 10 - Coolant temperature sender at radiator outlet -G83-
 - ☐ replace ⇒ [page 123](#)
- 11 - Retaining clip
 - ☐ check tightness
- 12 - 9 Nm
- 13 - 9 Nm
- 14 - 9 Nm
- 15 - Coolant line
- 16 - 9 Nm
- 17 - Gasket
 - ☐ replace
- 18 - Connection fittings
- 19 - 9 Nm
- 20 - Retaining clip
 - ☐ check tightness
- 21 - Coolant temperature sender -G62-
 - ☐ replace ⇒ [page 122](#)





22 - O-ring

- ☐ replace

23 - Double screw

- ☐ 9 Nm

24 - 9 Nm

25 - Left coolant pipe

- ☐ removing and installing ⇒ [page 128](#)

26 - 9 Nm

27 - 40 Nm

28 - 13 Nm

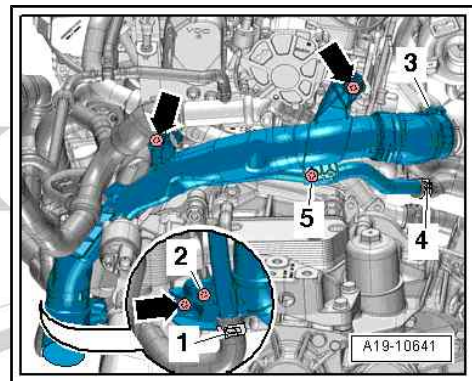
29 - Coolant recirculation pump 2 -V178-

- ☐ removing and installing ⇒ [page 124](#)

3.2 Replace coolant temperature sender - G62-

Replace

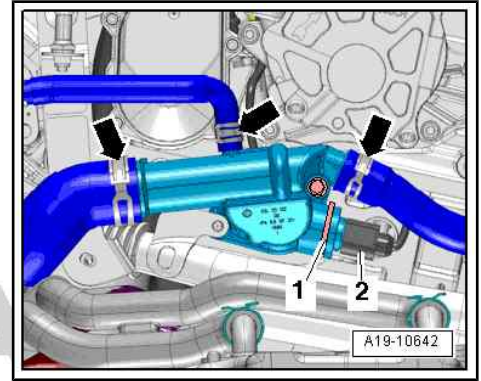
- Engine cold.
- Briefly open the cap for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system.
- Remove the air filter housing ⇒ [page 196](#) .
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Unscrew screws -2 and 5- and screws -arrows-.
- Release the screw clamp -3- and push the left charge air pipe and the left coolant pipe to the left.



- Disconnect plug -2- from coolant temperature sender -G62- .

Note

- ◆ *In order to collect flowing out coolant, place a cloth below the connection fitting.*
- ◆ *Have a new coolant temperature sender -G62- with a new gasket ring ready.*
- Remove the retaining clip -1-, pull the coolant temperature sender -G62- out of the connection fitting and install a new coolant temperature sender -G62- .
- Inspect coolant level, top up with coolant if necessary
⇒ [page 111](#) .

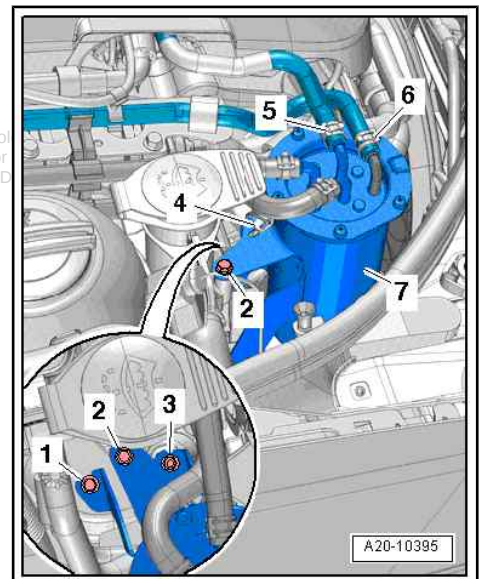


Further installation occurs in reverse order.

3.3 Replace coolant temperature sender at radiator outlet -G83-

Replace

- Engine cold.
- Briefly open the cap for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system.
- Remove engine cover ⇒ [page 17](#) .
- Release screw -1-.
- Release screw -2- and nut -3-.
- Remove the hose clamp -4- from the fuel filter, lay the fuel filter -7- with the connected fuel hoses -5- and -6- to the side.





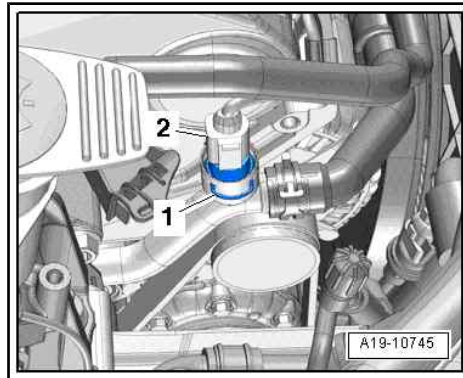
- Disconnect plug -2- at the coolant temperature sender at radiator outlet -G83- .



Note

- ◆ *In order to collect flowing out coolant, place a cloth below.*
- ◆ *Prepare a new coolant temperature sender at radiator outlet -G83- with a new gasket ring.*
- Remove the retaining clip -1-, pull the coolant temperature sender -G62- out of the connection fitting and install a new coolant temperature sender -G62- .
- Inspect coolant level, top up with coolant if necessary
⇒ [page 111](#) .

Further installation occurs in reverse order.



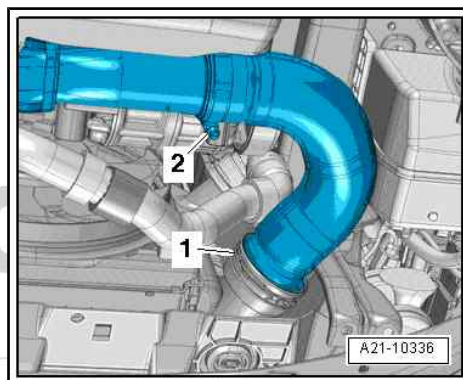
3.4 Remove and install coolant recirculation pump 2 -V178-

Special tools and workshop equipment required

- ◆ Hose clamps up to 25 mm -MP7-602 (3094)-
- ◆ Pliers for spring strap clamps

Removing

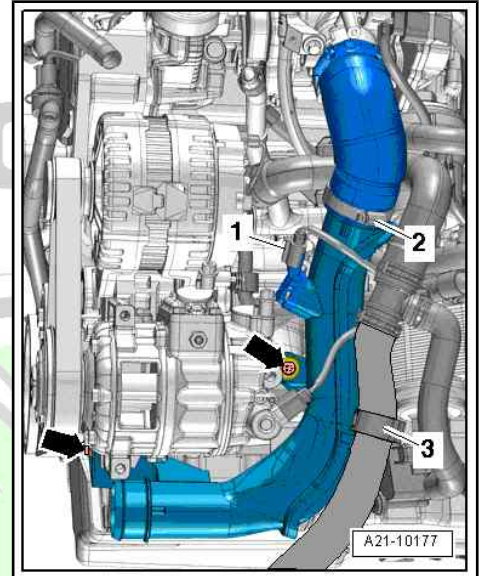
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Remove the right charge air hose, to do so loosen the hose clamp -2- and raise the retaining clip -1-.



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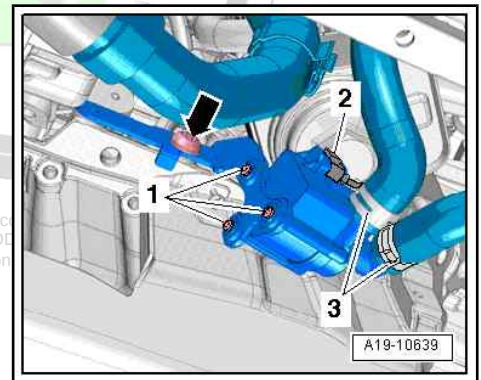
- Release screws -arrows-.
- Slacken the hose clamp -2- and push the right charge air pipe to the right.



i Note

In order to collect flowing out coolant, place a cloth below the coolant recirculation pump 2 -V178-.

- Pinch off coolant hoses with hose clamps up to 25 mm - MP7-602- and remove, to do so slacken spring strap clamps -3-.
- Unplug connector -2-.
- Release screws -1- and remove coolant recirculation pump 2 -V178-.



Install

Installation is performed in the reverse order, pay attention to the following points:

i Note

- ♦ *Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.*
- ♦ *For this step, observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 169](#).*
- Inspect coolant level, top up with coolant if necessary ⇒ [page 111](#).

3.5 Removing and installing the front coolant pipe

Special tools and workshop equipment required

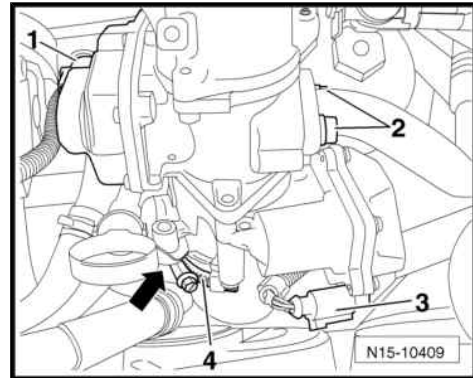
- ♦ Pliers for spring strap clamps

Removing

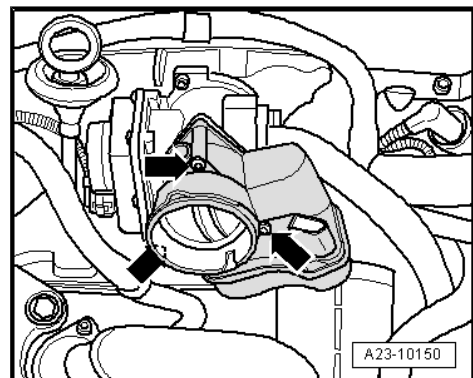
- Remove the air filter housing ⇒ [page 196](#).
- Remove oil filter holder ⇒ [page 103](#).
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27



- Disconnect the plug -3- from the throttle valve control unit - J338 - .
- Unscrew screws -2- on the pipe for exhaust gas recirculation.

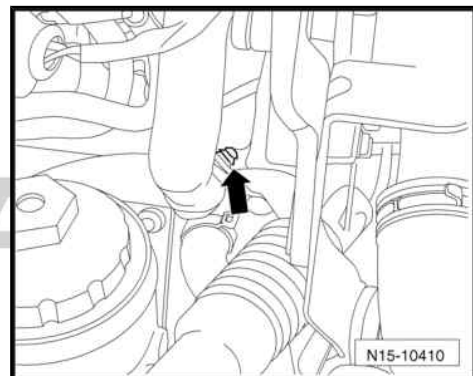


- Release screws -arrows- and remove throttle valve control unit -J338- .

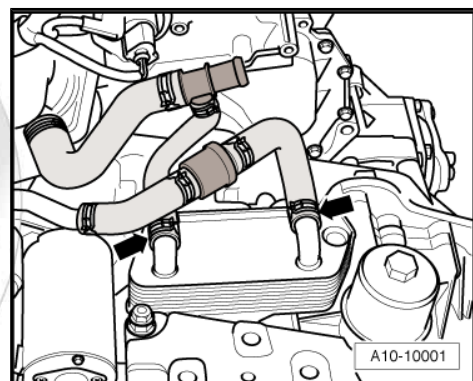


- Unclip the wiring loom from the holder -arrow-.

Vehicles with automatic gearbox

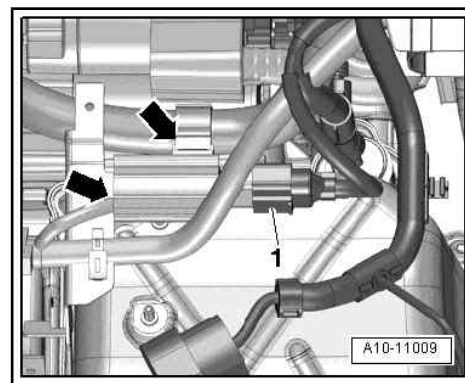


- Remove the coolant hoses from the gearbox oil cooler, to do so slacken the hose clamps -arrows-.

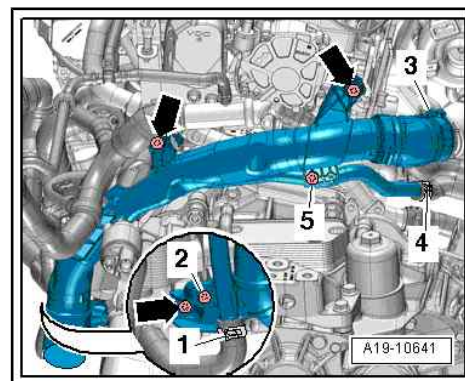


Continued for all vehicles

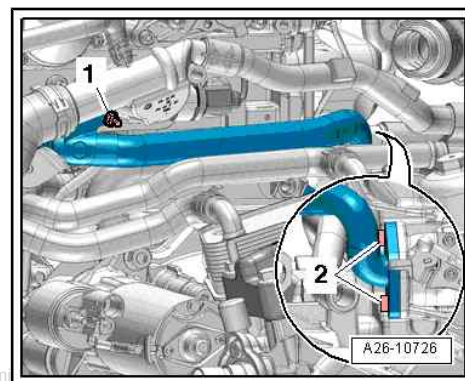
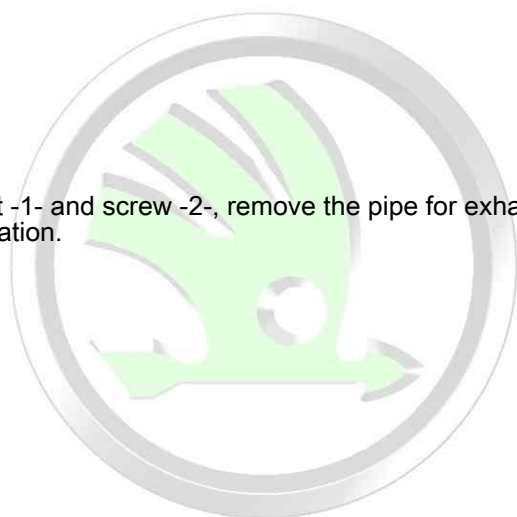
- Expose the wiring looms -arrows- and the electrical plug connection -1- on the bracket.



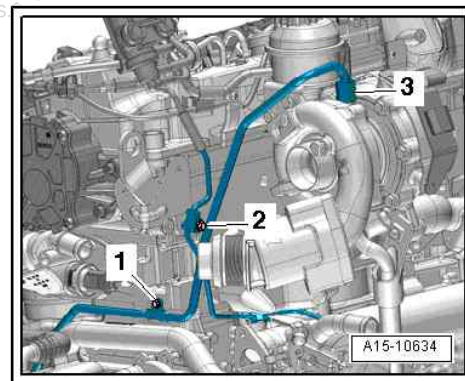
- Unscrew screws -2 and 5- and screws -arrows-.
- Release screw clamp -3- and remove left charge air pipe.



- Release nut -1- and screw -2-, remove the pipe for exhaust gas recirculation.



- Release the nut -2- at the retaining clip for the vacuum line.
- Release screw -1-.
- Unscrew the oil feed line from the connection on the exhaust turbocharger, to do so counterhold on the hexagon using an open-end wrench and slacken the union nut -3-.



- Remove the electrical plug connection -2- for the hall sender -G40- from the bracket and disconnect.
- Remove the bracket from the coolant pipe.
- Remove the coolant hoses, to do so slacken the hose clamps -1- and -3-.
- Unscrew screws -arrows- and detach the front coolant pipe from the cylinder block to the left-hand side.

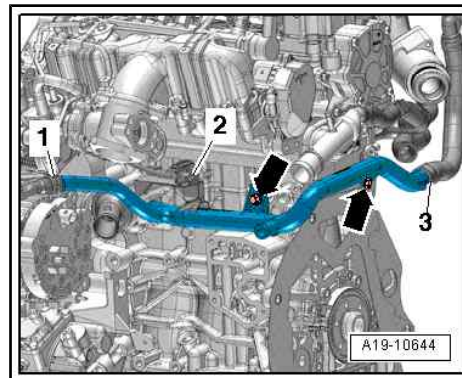
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ◆ Replace gaskets, gasket rings and O-rings.
- ◆ Tightening torques: ➔ [page 121](#)
- Clean sealing surface for O-ring, if necessary smoothen.
- Moisten O-ring with coolant and fit onto coolant pipe.
- Slide the front coolant pipe into the cylinder block.
- Install the oil feed line ➔ [page 99](#) .
- Install the pipe for the exhaust gas recirculation ➔ [page 209](#) .
- Install the left charge air pipe ➔ [page 167](#) .
- Install the throttle valve control unit -J338- ➔ [page 192](#) .
- Top up coolant ➔ [page 111](#) .



3.6 Remove and install the left coolant pipe

Special tools and workshop equipment required

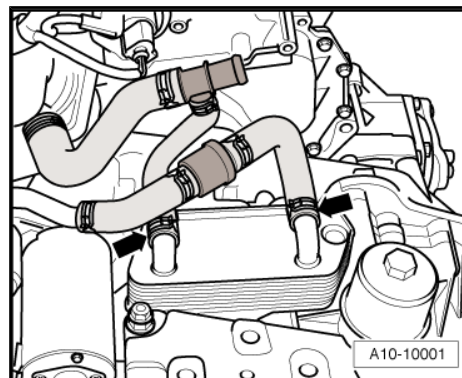
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Hose clamps up to 25 mm -MP7-602 (3094)-
- ◆ Pliers for spring strap clamps

Removing

- Remove battery and battery tray ➔ **Electrical System; Rep. Gr. 27**
- Remove fan shroud with radiator ➔ [page 132](#) .

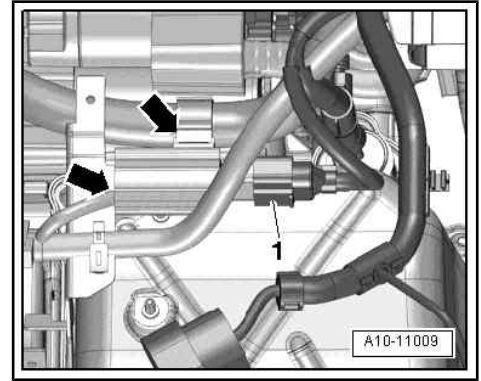
Vehicles with automatic gearbox

- Pinch off the coolant hoses with the hose clamps up to 25 mm -MP7-602- and remove from the gearbox oil cooler, to do so slacken the hose clamps -arrows-.



Continued for all vehicles

- Expose the wiring looms -arrows- and the electrical plug connection -1- on the bracket.

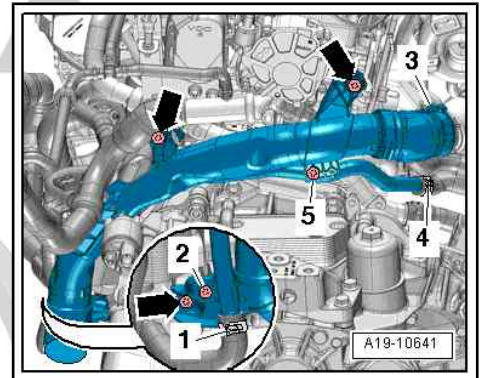


- Unscrew screws -2 and 5- and screws -arrows-.
- Release screw clamp -3- and remove left charge air pipe.
- Place an oil pan -VAS 6208- under the engine.
- Pinch off the coolant hoses with the hose clamps up to 25 mm -MP7-602- and remove from the left coolant pipe, to do so slacken the spring strap clamps -1- and -4-.
- Remove the left coolant pipe.

Install

Installation is performed in the reverse order, pay attention to the following points:

- ◆ Tightening torques: ➔ [page 121](#)
- Install the left charge air pipe ➔ [page 167](#) .
- Top up coolant ➔ [page 111](#) .



3.7 Removing and installing the right coolant pipe

Special tools and workshop equipment required

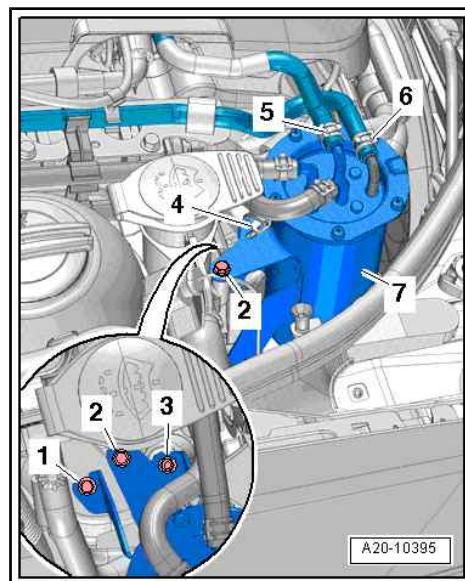
- ◆ Catch pan for workshop crane, e.g. -VAS 6208-
- ◆ Hose clamps up to 25 mm -MP7-602 (3094)-
- ◆ Pliers for spring strap clamps

Removing

- Remove engine cover ➔ [page 17](#) .



- Release screw -1-.
- Release screw -2- and nut -3-.
- Remove the hose clamp -4- from the fuel filter, lay the fuel filter -7- with the connected fuel hoses -5- and -6- to the side.
- Remove the right wheelhouse liner bottom part ⇒ Body Work; Rep. Gr. 66 .
- Place an oil pan -VAS 6208- under the engine.



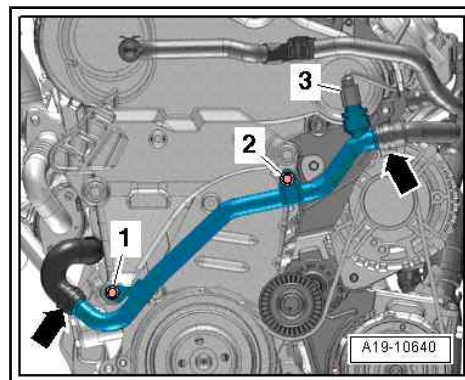
- Disconnect plug -3- at the coolant temperature sender at radiator outlet -G83- .
- Pinch off the coolant hoses with the hose clamps up to 25 mm -MP7-602- and remove from the right coolant pipe, to do so slacken the spring strap clamps -arrows-.
- Release nut -1- and screw -2-, remove right coolant pipe.

Install

•

Installation is performed in the reverse order, pay attention to the following points:

- ◆ Tightening torques: ⇒ [page 121](#)
- Install fuel filter ⇒ [page 141](#) .
- Top up coolant ⇒ [page 111](#) .



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4 Radiator and radiator fan

4.1 Summary of components

1 - Top coolant hose

- ☐ to connection fitting laterally at cylinder head
- ☐ connection diagram for coolant hoses
⇒ [page 108](#)

2 - O-ring

- ☐ replace if damaged

3 - Radiator

- ☐ removing and installing
⇒ [page 132](#)
- ☐ after replacing fill entire system with fresh coolant ⇒ [page 111](#)

4 - Screw cap

- ☐ Test pressure
0.14...0.16 MPa
(1.4...1.6 bar)
- ☐ check ⇒ [page 134](#)

5 - Connector

6 - 3 Nm

7 - Expansion reservoir

8 - 5 Nm

9 - 5 Nm

10 - Bottom coolant hose

- ☐ to connection fitting for coolant regulator at cylinder block
- ☐ connection diagram for coolant hoses
⇒ [page 108](#)

11 - Right radiator fan -V35-

- ☐ removing and installing ⇒ [page 132](#)

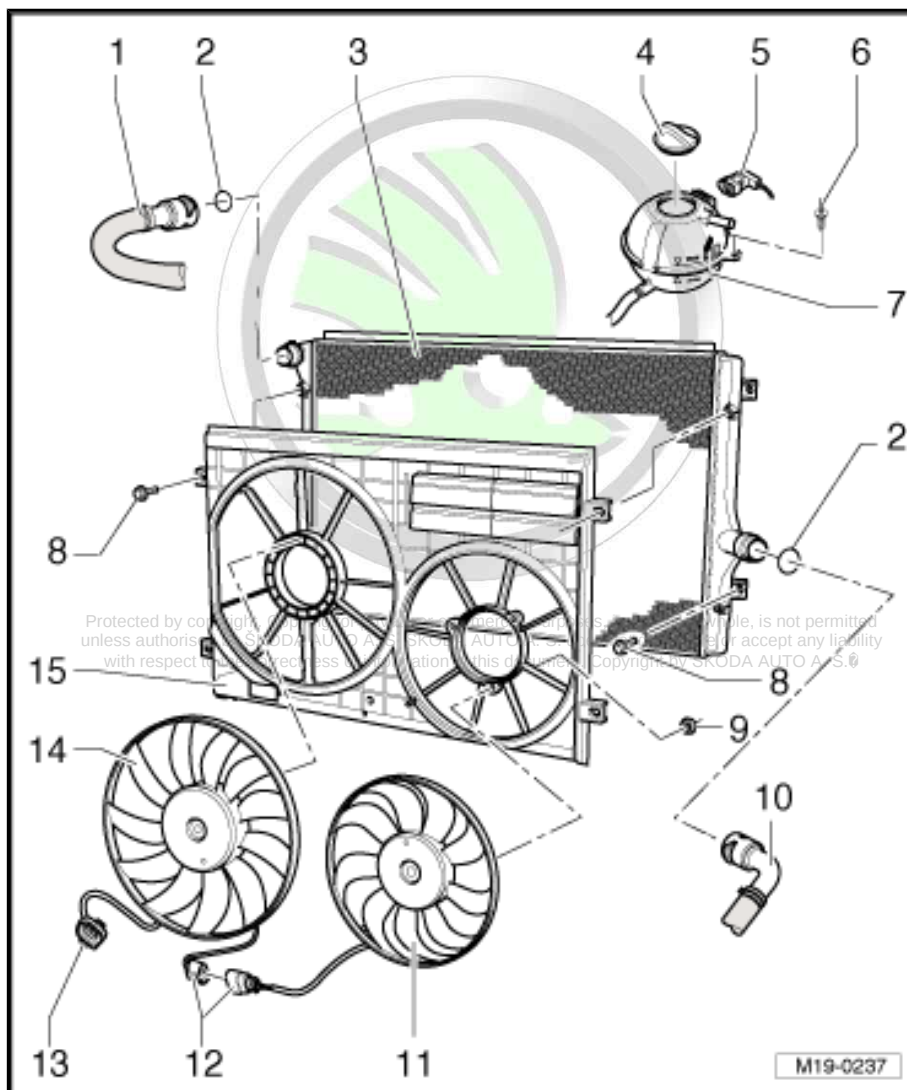
12 - Connector

13 - Connector

14 - Radiator fan -V7-

- ☐ with radiator fan control unit -J293-
- ☐ removing and installing ⇒ [page 132](#)

15 - Fan shroud



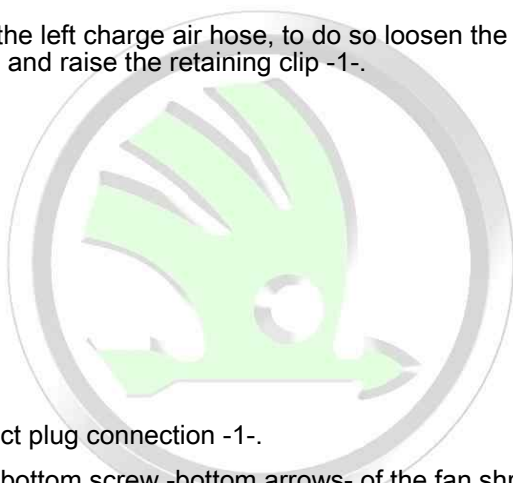
4.2 Removing and installing fan shroud for radiator fan -V7- and right radiator fan - V35-

Removing

- Unscrew top screws -top arrows- of the fan shroud.
- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .

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- Remove the left charge air hose, to do so loosen the hose clamp -2- and raise the retaining clip -1-.



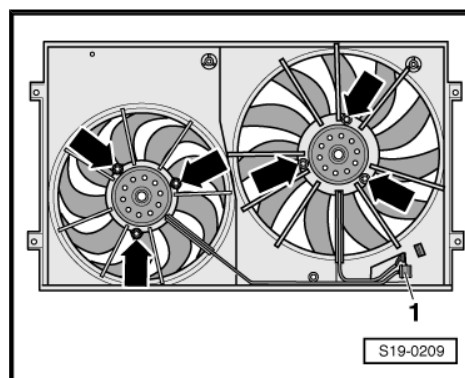
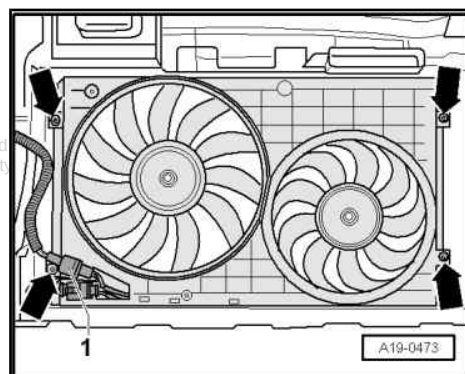
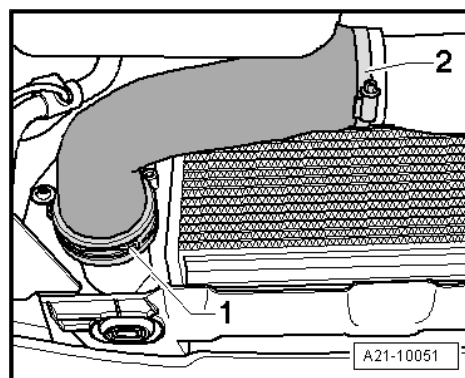
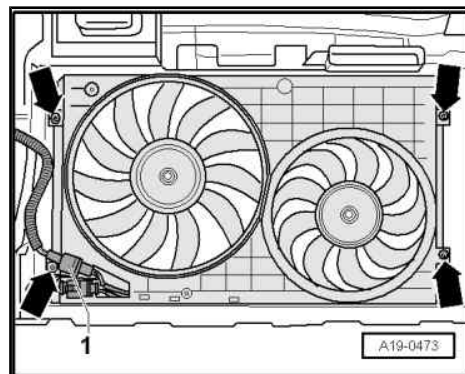
- Disconnect plug connection -1-.
- Unscrew bottom screw -bottom arrows- of the fan shroud.
- Remove fan shroud with radiator fans downwards.

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- Separate plug connection -1- and expose cables.
- Unscrew the nuts -arrows- and remove the radiator fan.

Install

Installation is carried out in the reverse order.



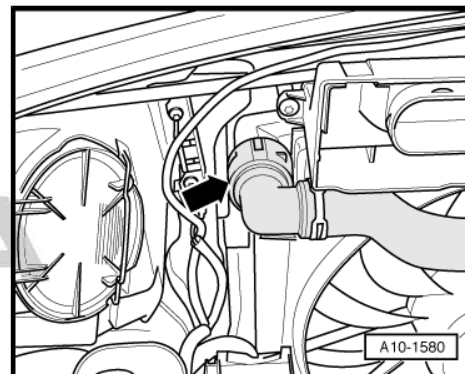
4.3 Removing and installing radiator

Special tools and workshop equipment required

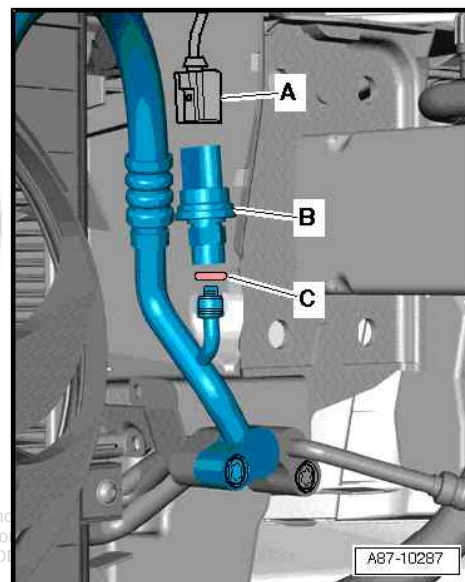
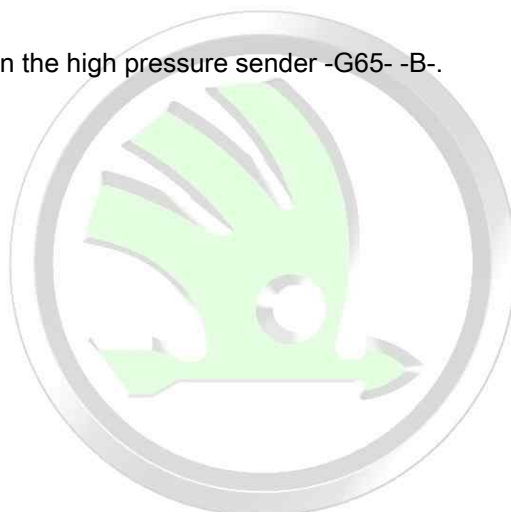
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps

Removing

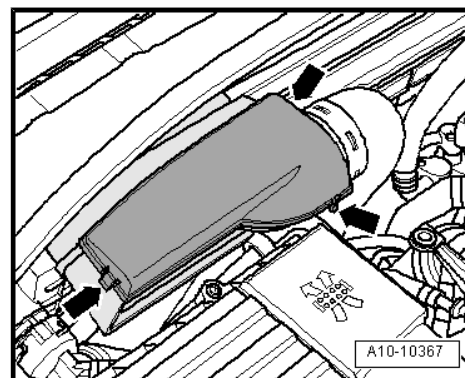
- Drain coolant ⇒ [page 111](#) .
- Pull off left coolant hose from radiator -arrow-.
- Remove fan shroud with radiator fans ⇒ [page 132](#) .



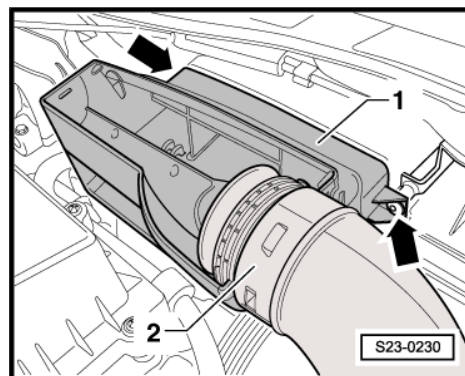
- Disconnect plug -A- on the high pressure sender -G65- -B-.



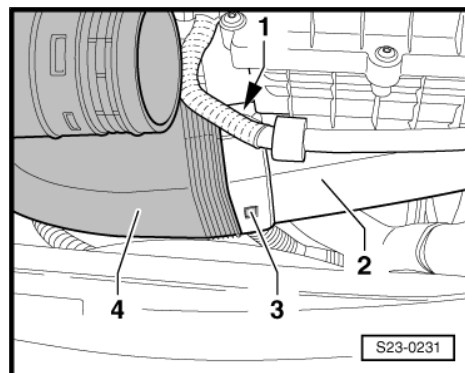
- Remove cover for air intake connection, to do so release lateral retaining clasps -arrows-.



- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.



- Press in catch pegs -1- and -3- and pull off connecting hose -4- from air filter housing -2-.



- Screw out screws -arrows- and remove the radiator upwards.

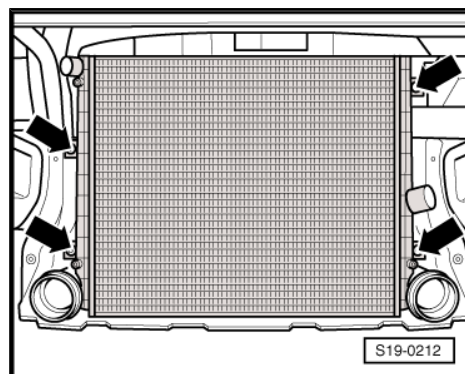
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ♦ Replace gasket rings and O-rings.
- ♦ Secure all hose connections with corresponding hose clips.
- Top up coolant ⇒ [page 111](#).



4.4 Checking the coolant system for leak-tightness

4.4.1 Checking with the cooling system testing device -V.A.G 1274-

Special tools and workshop equipment required

- ♦ Coolant system tester , e.g. -V.A.G 1274-
- ♦ Adapter , e.g. -V.A.G 1274/8-
- ♦ Adapter , e.g. -V.A.G 1274/9-

Test condition

- Engine must be warm.

Test sequence



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened.

- ◆ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open the cap of the coolant expansion reservoir.
- Position tester -V.A.G 1274- with adapter -V.A.G 1274/8- on the compensation bottle.
- Generate a pressure of approx. 0.1 MPa (1.0 bar) for testing the cooling system.

If the pressure drops:

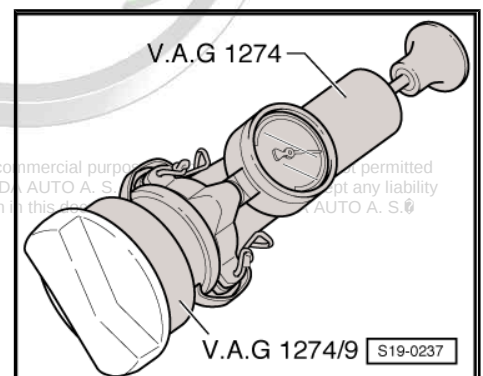
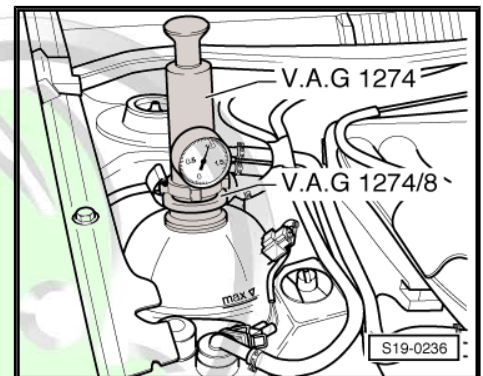
- Search position of the leak and repair fault.

Test the pressure valve in the cap

- Position the cooling system testing device -V.A.G 1274- with adapter -V.A.G 1274/9- on the cap.
- Generate a pressure for testing the pressure valve in the cap.
- The pressure valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the valve does not open in the prescribed pressure range:

- Replace cap.



4.4.2 Checking with the cooling system testing device -V.A.G 1274 B-

Special tools and workshop equipment required

- ◆ Coolant system tester , e.g. -V.A.G 1274 B-
- ◆ Adapter , e.g. -V.A.G 1274/8-
- ◆ Adapter , e.g. -V.A.G 1274/9-

Test condition

- Engine must be warm.



Test sequence



WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened.

- ◆ *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open the cap of the coolant expansion reservoir.
- Screw the adapter -V.A.G 1274/8- into the coolant expansion reservoir.
- Connect the connecting piece -V.A.G 1274 B/1- to the adapter -V.A.G 1274/8-.
- Connect the connecting piece -V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device -V.A.G 1274 B-.
- Using the hand pump of the testing device generate a pressure of approx. 0.1 MPa (1.0 bar).



WARNING

Risk of burning!

- ◆ *Before the cooling system testing device -V.A.G 1274 B- is separated from the connecting hose or the connecting piece -V.A.G 1274 B/1-, the existing pressure must absolutely be released.*
- ◆ *For this step, press the pressure relief valve on the cooling system testing device -V.A.G 1274 B- until the pressure gauge indicates the value "0".*

If the pressure drops:

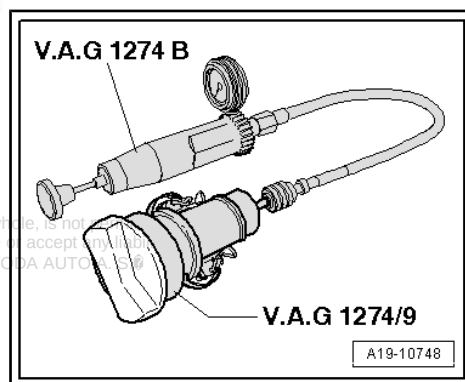
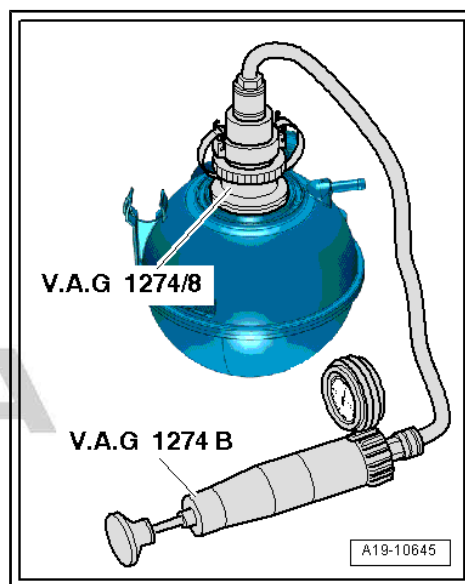
- Search position of the leak and repair fault.

Test the pressure valve in the cap

- Screw the cap into the adapter -V.A.G 1274/9-.
- Connect the connecting piece -V.A.G 1274 B/1- to the adapter -V.A.G 1274/9-.
- Connect the connecting piece -V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device -V.A.G 1274 B-.
- Generate a pressure for testing the pressure valve in the cap.
- The pressure valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the valve does not open in the prescribed pressure range:

- Replace cap.



20 – Fuel Supply

1 Removing and installing parts of the fuel supply system



Note

- ◆ Fuel lines are secured with quick-release couplings.
- ◆ Fuel hoses must be secured only with spring strap clips. The use of clamp-type or screw-type clips is not allowed.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.

Observe safety measures ⇒ [page 3](#) .

Observe rules for cleanliness ⇒ [page 6](#) .

1.1 Procedure after fueling with incorrect fuel



Caution

Fueling with incorrect fuel can result in irreversible damage to the high pressure parts, in particular to the fuel high pressure pump, because of inadequate fuel lubricity and the dirt contained in the fuel.

- ◆ There is a risk of damage in the form of rubbing and the formation of abrasion.
- ◆ This abrasion damages the fuel pressure regulating valve and the injection unit.

Here are two examples which show the consequences of fueling with incorrect fuel:

Example 1

Fueling with incorrect fuel is noticed BEFORE starting the engine, the engine was NOT started.

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Example 2

Fueling with incorrect fuel was noticed only AFTER starting the engine. Contaminated or incorrect fuel was already drawn in and is present in the high pressure parts.



Note

Collect the incorrect fuel which was drained from the fuel tank and the diesel fuel which was used for cleaning the fuel tank and dispose.

Procedure in case of example 1

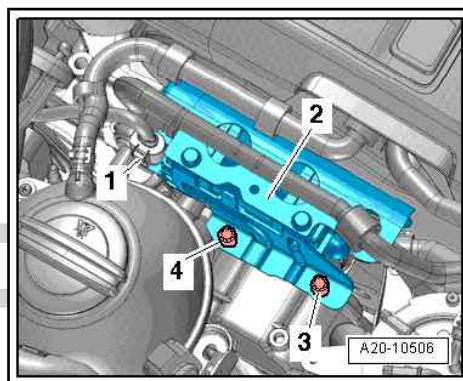


Caution

Do not switch on the ignition.

The engine must not be started.

- Disconnect the plug -1- at the additional fuel pump -V393- in the engine compartment.
- Drain the fuel tank completely ⇒ [page 141](#) .
- Fill the fuel tank with 5 litres of diesel fuel and empty it again.
- Completely fill up the fuel tank with diesel fuel.
- Fit the plug at the additional fuel pump -V393- in the engine compartment.
- Perform a test drive.



Procedure in case of example 2

- Drain the fuel tank completely ⇒ [page 141](#) .
- Remove fuel delivery unit ⇒ [page 143](#) .
- Check the fuel tank for dirt and fine metal swarf, if necessary clean with great care.
- Install fuel delivery unit ⇒ [page 143](#) .
- Fill the fuel tank with 5 litres of diesel fuel and empty it again.
- Replace the fuel filter ⇒ [page 141](#) .
- Replace all of the following parts:
 - ◆ High pressure pump ⇒ [page 183](#) .
 - ◆ High pressure lines.
 - ◆ Fuel high pressure reservoir.
 - ◆ Fuel pressure regulating valve -N276- ⇒ [page 189](#) .
 - ◆ Fuel pressure sender -G247- ⇒ [page 181](#) .
 - ◆ Injection units ⇒ [page 178](#) .
 - ◆ Fuel return-flow lines ⇒ [page 174](#) .
 - ◆ Additional fuel pump -V393- in engine compartment ⇒ [page 152](#) .
- Completely fill up the fuel tank with diesel fuel.
- Fill up the fuel system ⇒ [page 185](#) .
- Perform a test drive.

1.2 Fuel tank with attached parts

1 - Mounting part

2 - Screw cap

- ☐ replace the O-ring if it is damaged

3 - Earth connection

4 - 11 Nm

5 - Line

6 - 25 Nm

- ☐ replace

7 - Fuel tank

- ☐ during removal, support using the engine and gearbox jack, e.g. - V.A.G 1383 A-
- ☐ removing and installing ⇒ [page 145](#)

8 - Circlip

9 - Bracket for the exhaust system

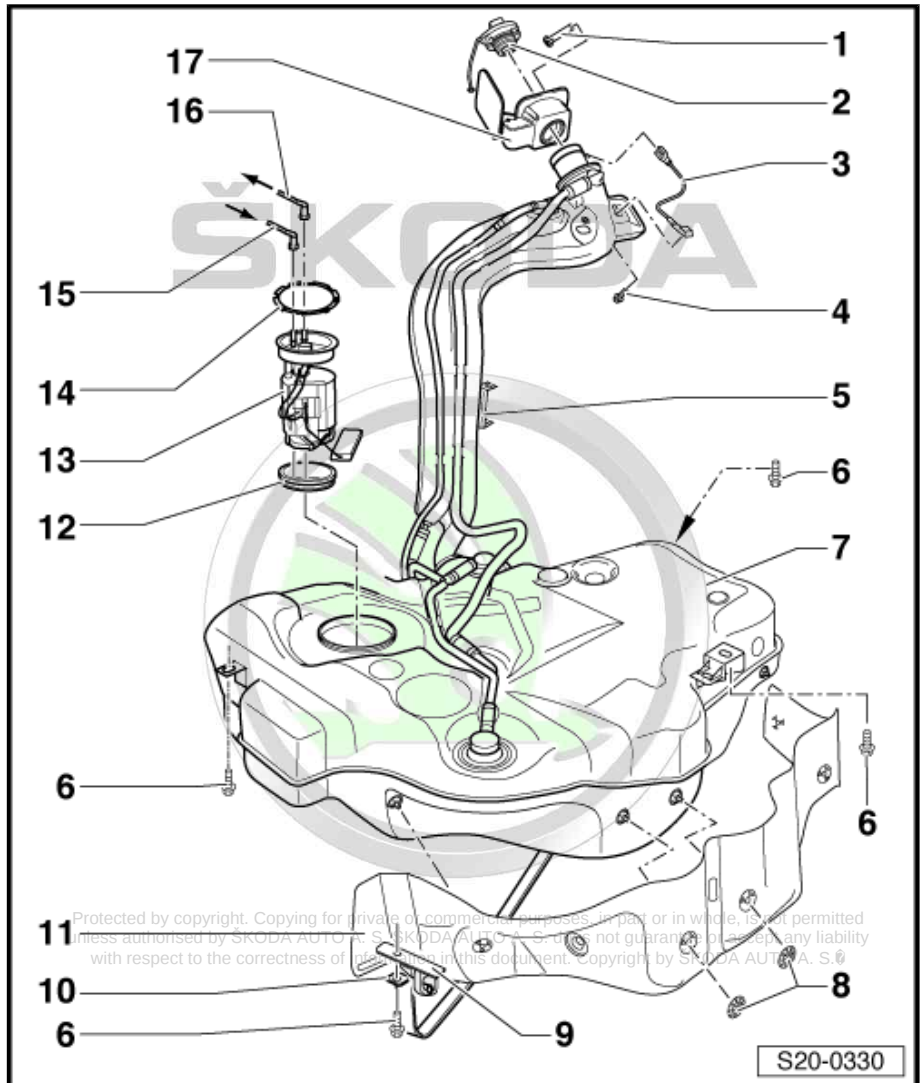
10 - Tensioning strap

- ☐ Check fitting position

11 - Heat shield

12 - Sealing ring

- ☐ replace
- ☐ to be inserted dry into the opening of the fuel tank
- ☐ must be moistened on the inside with fuel before assembly of the fuel delivery unit



13 - Fuel pump

- ☐ with sender for fuel gauge display
- ☐ removing and installing ⇒ [page 143](#)
- ☐ note the correct installed position of the fuel tank ⇒ [page 140](#)
- ☐ inspecting fuel pump ⇒ [page 147](#)
- ☐ Clean strainer if dirty
- ☐ removing and installing fuel gauge ⇒ [page 144](#)

14 - Lock ring - 110 Nm

- ☐ remove and install with the wrench for fuel tank sender -T30101 (3087)-
- ☐ pay attention to correct position

15 - Return-flow line

- ☐ from fuel filter
- ☐ clipped in place on fuel tank
- ☐ pay attention to correct position
- ☐ blue

16 - Feed line

- ☐ to fuel filter
- ☐ clipped in place on fuel tank
- ☐ pay attention to correct position



- ☐ black

17 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ Removing and installing ⇒ Body Work; Rep. Gr. 55

Fitting position of the fuel pump

Marking -3- on the flange points of the fuel pump against the direction of travel.



Note

The fuel pump can only be installed in this position.

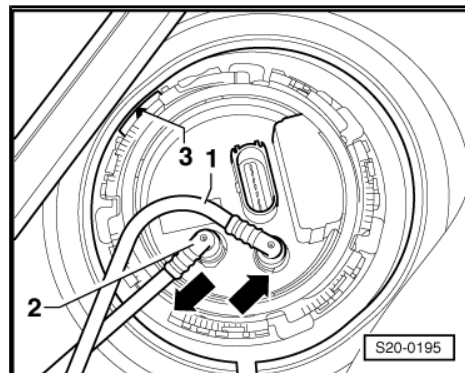
Blue return-flow line -1-.

Black feed line -2-.



Note

After installing the fuel pump, check whether the feed and return-flow line are still clipped in place on the fuel tank.



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1.3 Removing and installing fuel filter



Before disconnecting the fuel hoses, mark assignment to the pipe supports.

1 - Return-flow hose

- ☐ to fuel tank
- ☐ blue marking and blue inscription
- ☐ is placed on the blue line on the separation point in the engine compartment on the right

2 - Intake hose

- ☐ from fuel tank
- ☐ white marking and white inscription
- ☐ is placed on the black line on the separation point in the engine compartment on the right

3 - Fuel filter - top part

- ☐ raise at the assembly groove using the offset screwdriver -VAS 6543-
⇒ Maintenance ; Octavia II

4 - 5 Nm

5 - Return-flow hose

- ☐ of engine
- ☐ blue marking and blue inscription

6 - Intake hose

- ☐ to additional fuel pump
- ☐ white marking and white inscription

7 - Sealing ring

- ☐ replace

8 - Fuel filter element

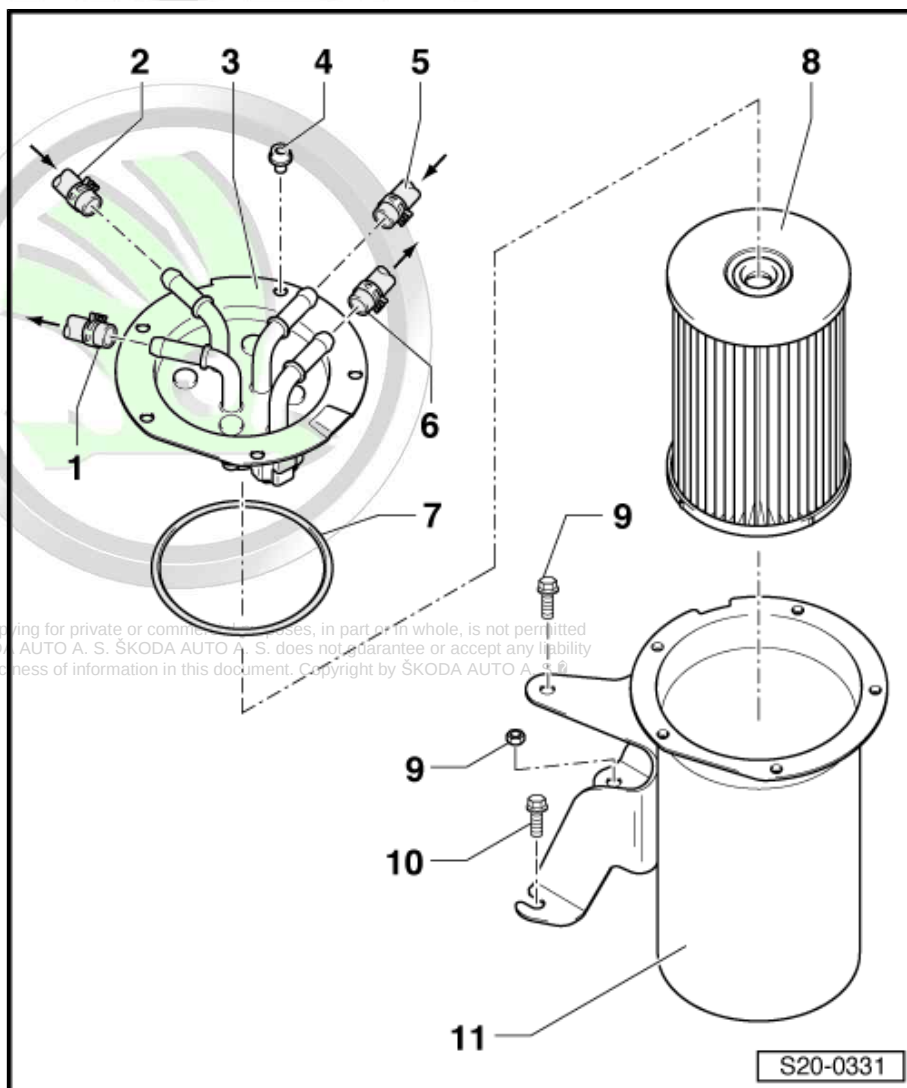
- ☐ pay attention to change intervals ⇒ Maintenance ; Octavia II

9 - 8 Nm

10 - 8 Nm

- ☐ to remove fuel filter only slacken screw

11 - Fuel filter - bottom part with integrated bracket



1.4 Drain the fuel tank

Special tools and workshop equipment required

- ◆ Hose adapter , e.g. -V.A.G 1318-16 -



- ◆ Adapter , e.g. -V.A.G 1318-17-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-
- ◆ Battery
- ◆ Fuel tank

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Note

If the fuel delivery unit is defective, suction off fuel using a fuel suction device , e.g. -VAS 5190- .

Work procedure



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Observe rules for cleanliness ⇒ [page 6](#) .*
- Switch off the ignition and pull out the ignition key.
- Fold up rear seat.
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.



Note

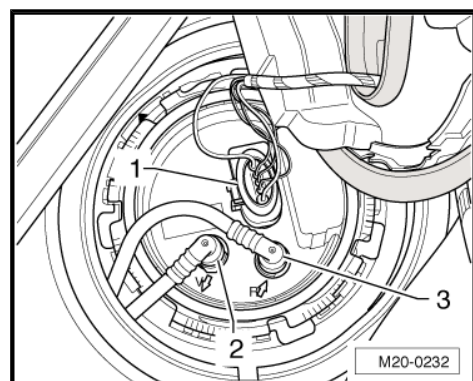
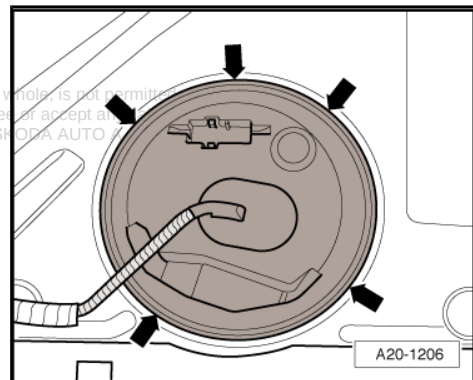
For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.

- Unplug the 5-pin connector -1- and the black feed line -2-.



Note

Press in securing ring in order to unlock the line.



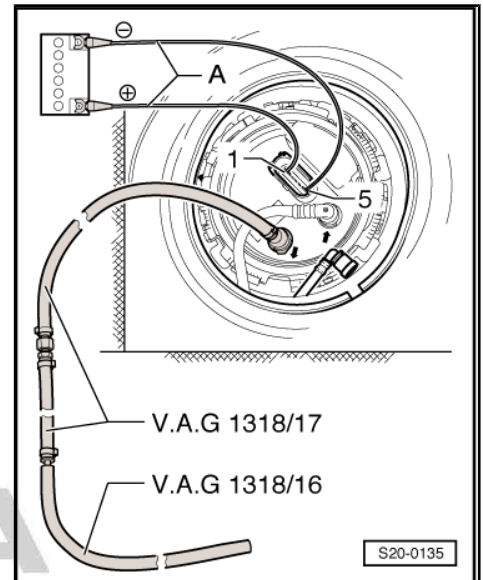
- Connect the adapter set -V.A.G 1318-17- and the hose adapter -V.A.G 1318/16- and fit the “drain pipe” onto the feed support of the fuel delivery unit.
- Hold the “drain pipe” in a suitable fuel tank.
- Connect the battery and the contacts of the fuel pump with adapter cables -A- from the adapter cable set as follows:
Battery positive (+) to contact -1- of the fuel pump
Battery minus (-) to contact -5- of the fuel pump

The fuel pump runs and delivers fuel.



WARNING

In order to prevent an overflow of fuel in case of a too small fuel tank, the fuel pump must not run unattended.



1.5 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Wrench for the lock ring -T30101 (3087) -
- ◆ Torque wrench

Removing

- The fuel tank must not be more than $\frac{3}{4}$ full.



Note

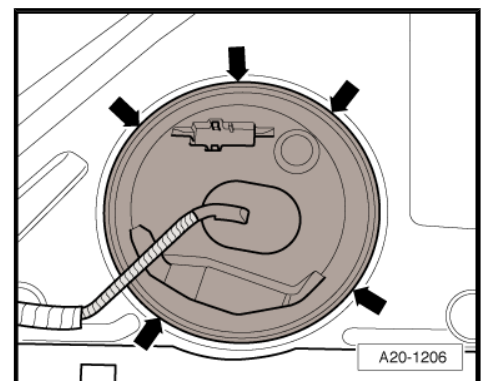
- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).

- Switch off the ignition and pull out the ignition key.
- If necessary drain the fuel tank ⇒ [page 141](#).
- Fold up rear seat.
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.



Note

For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.



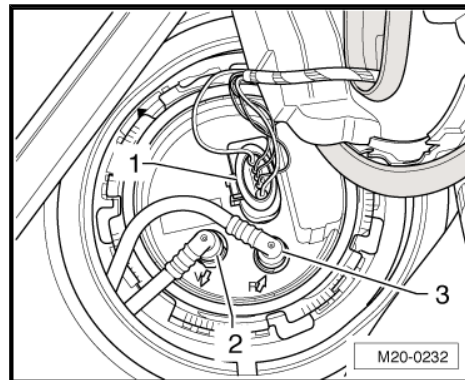


- Unplug the 5-pin plug -1-, the black feed line -2- and blue re-flow line -3- abziehen.



Note

- ♦ Press in securing ring in order to unlock the line.
- ♦ On vehicles with auxiliary heating the suction line for the dosing pump -V54- must be pulled out additionally (open lower clamp).



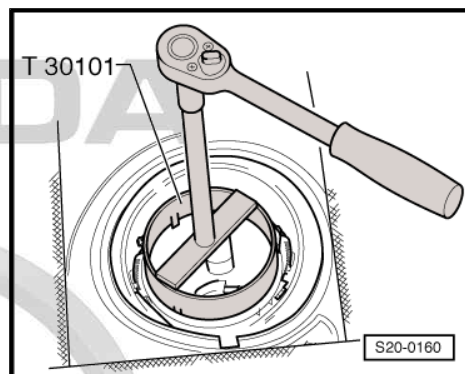
- Open lock ring with the wrench -T30101- .



Note

When installing, ensure that the float arm of the sender for fuel gauge display -G- is not bent.

- Pull the fuel pump and the gasket ring out of the opening of the fuel tank.



Note

You must empty the old fuel pump before disposing of it if you wish to replace it.

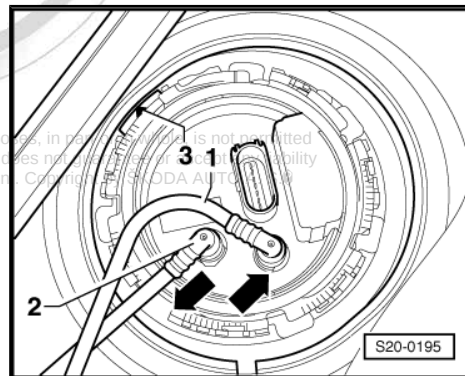
Install

- The installation of the fuel delivery unit occurs in the reverse order. Pay attention to the following:



Note

- ♦ Insert new dry gasket ring into the opening of the fuel tank.
- ♦ The gasket ring must only be moistened on the inside with fuel before assembly of the fuel delivery unit.
- ♦ When installing, do not bend the sender for fuel gauge display.
- ♦ Fitting position of the fuel delivery unit: Marking -3- on the flange of the fuel delivery unit must point against the direction of travel. The fuel pump can only be installed in this position.
- ♦ Do not interchange feed line and return-flow line.
- ♦ Tighten the lock ring to 110 Nm.
- ♦ Make sure the connections fit tightly.
- ♦ After installing the fuel pump, check whether the feed and re-flow line are still clipped in place on the fuel tank.

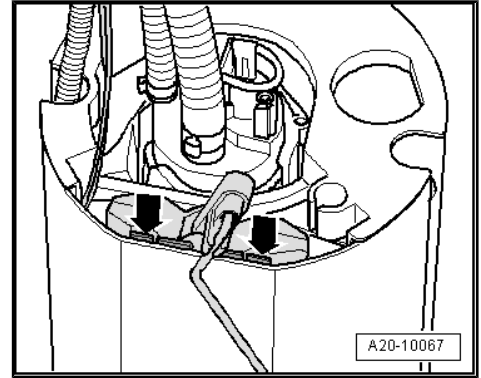


1.6 Removing and installing fuel gauge display -G-

Removing

- Remove fuel pump ⇒ [page 143](#) .

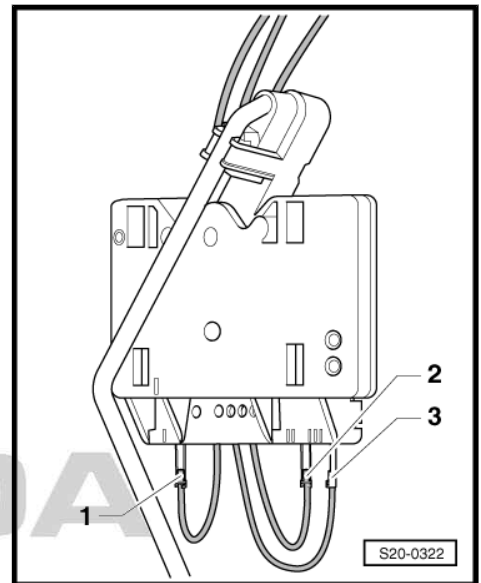
- Unlock the catches -arrows- using a screwdriver and pull out the sender for the fuel gauge display -G- towards the top.



- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).

Install

- Connect the lines and check the connector for secure catch.
- Insert the sender for fuel gauge display -G- in the guide at the fuel delivery unit and press downwards until it latches into position.
- Install fuel pump ➔ [page 143](#) .



1.7 Removing and installing the fuel tank

Special tools and workshop equipment required

- ◆ Engine and gearbox jack , e.g. -V.A.G 1383 A -
- ◆ Torque wrench

Removing



Note

- ◆ *Safety precautions when working on the fuel supply system* ➔ [page 3](#) .
- ◆ *Observe rules for cleanliness* ➔ [page 6](#) .
- Switch off the ignition and pull out the ignition key.
- Fold up rear seat.

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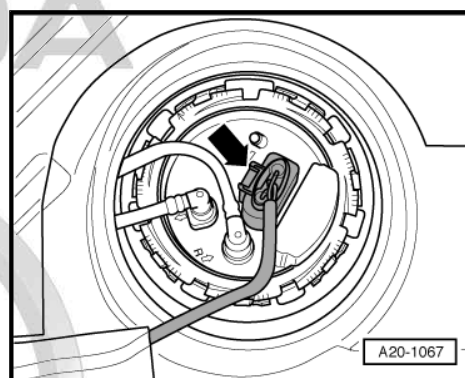
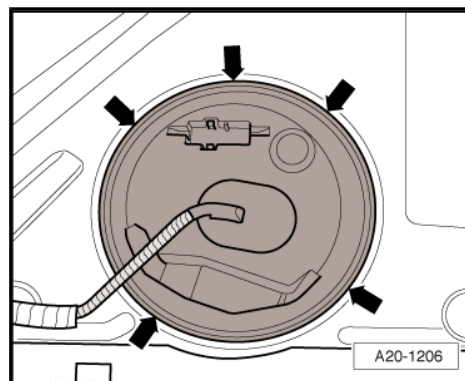
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.



Note

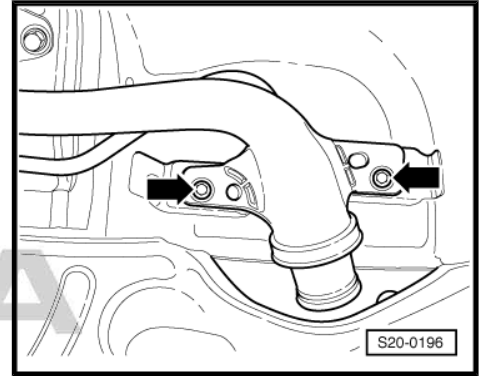
For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.

- Unplug connector -arrow-.
- Unscrew right rear wheel ⇒ Chassis; Rep. Gr. 44 .
- Remove the rear right wheelhouse liner ⇒ Body Work; Rep. Gr. 66 .



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- Unscrew fixing bolts on filler neck -arrows-.
- Clip the wiring loom out of the cable guide on filler neck.
- Remove rear tunnel bridge.
- Slacken front double clamp at exhaust pipe and push to the rear.
- Push out all suspensions of exhaust system from the retaining straps.
- Slightly lower the exhaust system and tie with wire to body.
- Disconnect the feed line and the return-flow line on the front right of the fuel tank.



Note

- ◆ *For vehicles with auxiliary heating, the fuel line of the dosing pump -V54- must also be disconnected.*
- ◆ *Press down the securing rings in order to unlock the connections of the fuel lines.*
- Unscrew tensioning strap.
- Support fuel tank using the engine/gearbox jack .
- Unscrew securing bolts.
- Lower fuel tank and swivel out.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- ◆ Lay the fuel lines avoiding any kinks.
- ◆ Do not mix-up the feed line and the return-flow line (the return-flow line is blue, the feed line is black).
- ◆ Make sure the connections fit tightly.
- ◆ Check feed line and return-flow line at fuel tank for firm seating.
- ◆ Check earth connection of fuel tank/body at filler neck.

1.8 Testing fuel pump

1.8.1 Check function and supply voltage of fuel pump

Special tools and workshop equipment required

- ◆ Measuring tool set , e.g. -V.A.G 1594 C -

Test conditions

- Battery voltage at least 12 V.
- Fuses o.k. ⇒ Current flow diagrams and Fitting locations.
- All electrical consumers such as the lights and rear window heater must be switched off.



Test sequence



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).
- Fold up rear seat.
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.



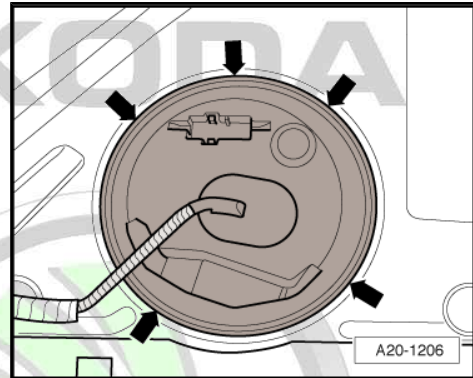
Note

For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.

- Switch on ignition.
- The fuel pump must be heard to start running.
- Switch off ignition.

If the fuel pump does not run:

- Continuing searching for faults using a multimeter ⇒ Current flow diagrams and Fitting locations.



1.8.2 Test feed pressure of fuel pump

Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -V.A.G 1318 -
- ◆ Adapter , e.g. -V.A.G 1318/17A-

Test conditions

- Battery voltage at least 12 V.
- Fuses o.k. ⇒ Current flow diagrams and Fitting locations.
- All electrical components such as lights and rear window heater must be switched off.

Test sequence

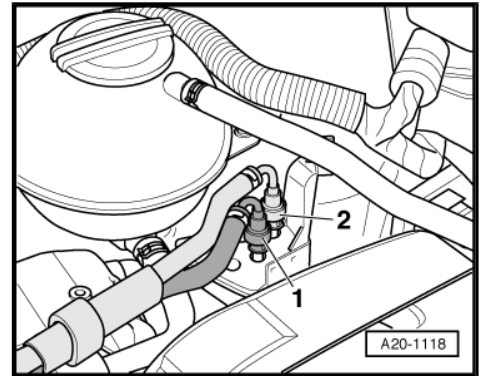


Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).

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- Separate fuel feed line -2-, to do so press in securing ring.



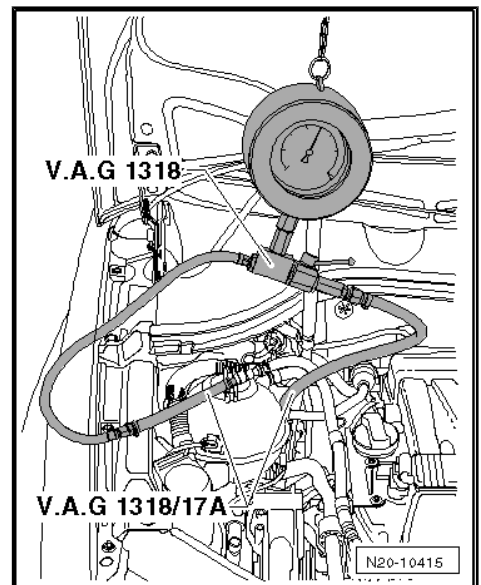
- Connect the pressure gauge -V.A.G 1318- with the adapter set -V.A.G 1318/17A- to the open ends of the fuel feed line (the illustration shows a different engine).
- Open shut-off cock of the pressure gauge.
- Start engine and run in idle.
- Read the pressure on the pressure gauge -V.A.G 1318- .
 - Specified value: min. 0.05 MPa (0.5 bar)
- Increase the engine speed to 2500 rpm and read the pressure on the pressure gauge -V.A.G 1318- .
 - Specified value: min. 0.025 MPa (0.25 bar)

If the specified value is not reached or if the feed pressure is temporarily interrupted:

- Replace fuel pump.

If the specified value is reached:

- Replace the fuel filter in order to prevent a fuel filter from being blocked.
- Check the fuel flow rate of the fuel pump ➔ [page 149](#) .



1.8.3 Check the fuel flow rate of the fuel pump

Special tools and workshop equipment required

- ◆ Remote control e.g. -V.A.G 1348/3A -
- ◆ Measuring tool set , e.g. -V.A.G 1594 C -
- ◆ Adapter , e.g. -V.A.G 1318/16-
- ◆ Adapter , e.g. -V.A.G 1318/17-
- ◆ Measuring vessel

Test conditions

- Battery voltage at least 12 V.
- Fuel temperature 15...30 °C.
- Fuel tank at least 1/4 full.



Test sequence



Note

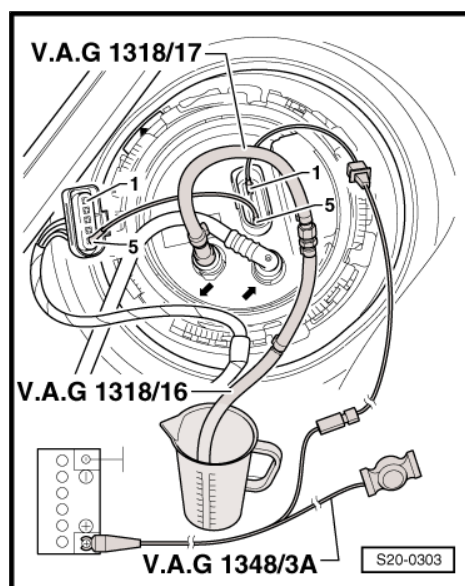
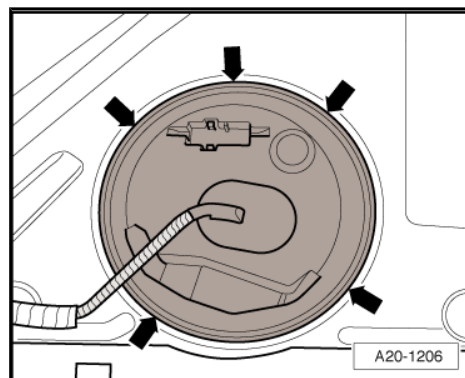
- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).
- Unscrew the cap from the filler neck.
- Fold up rear seat.
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.



Note

For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.

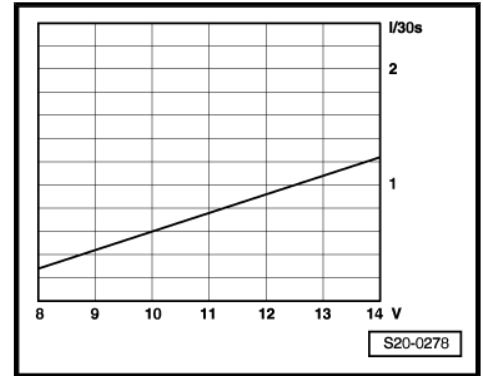
- Unplug the 5-pin plug from the fuel delivery unit.
- Connect remote control -V.A.G 1348/3A- with connection lines from measuring tool set to contact -1- of the fuel pump and to battery positive terminal.
- Use connection lines from the measuring tool set to connect the contacts -5- to the plug and to the fuel pump.
- Pull off the fuel feed line from the flange of the fuel pump.
- Connect adapter -V.A.G 1318/17- and adapter -V.A.G 1318/16-, fit onto the feed support and hold in a measuring vessel.
- Activate the remote control -V.A.G 1348/3A- for 30 seconds.
- Measure the battery voltage.



- Compare the fuel rate with the specified value.

Note

- ◆ The amount of the fuel pumped is dependent on the voltage.
- ◆ The diagram refers to the voltage which exists at the fuel pump.
- ◆ The voltage at the fuel pump is about 2 volts less than the battery voltage.



If the minimum flow rate is not reached:

- Remove the fuel pump and check whether the pump strainer is not clogged up.

If no fault was detected until now:

- Replace fuel delivery unit ⇒ [page 143](#).

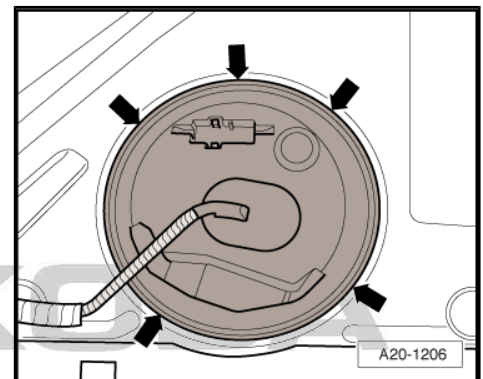
1.8.4 Check voltage consumption of the fuel pump

Special tools and workshop equipment required

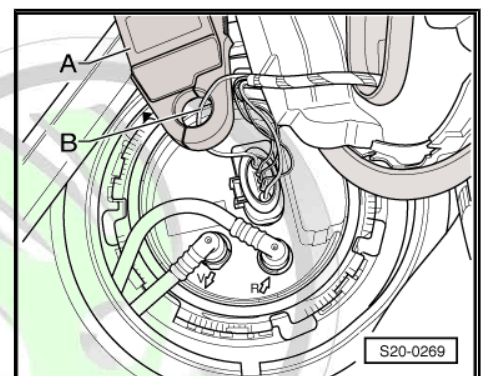
- ◆ Vehicle diagnosis, measurement and information system - VAS 5051-
- Fold up rear seat.
- Unclip retaining catches -arrows- of cover for the fuel pump and remove cover.

Note

For vehicles with auxiliary heating the plug connection for the dosing pump -V54- must be disconnected additionally.



- Connect the current probe -A- of the vehicle diagnosis, measurement and information system -VAS 5051- on the line -B- to contact 1 of the 5-pin plug.
 - Start engine and run in idle.
 - Measure power consumption of the fuel delivery unit.
- Specified value: a maximum of 7.5 amps.



Note

If the fault in the fuel supply system is intermittent then tests can be undertaken during a test drive but then two people are required for this.

If the specified current uptake is exceeded:

- Fuel pump faulty, replace fuel pump ⇒ [page 143](#).



1.9 Removing and installing additional fuel pump -V393-



Note

- ◆ *Safety precautions when working on the fuel supply system ➔ [page 3](#).*
- ◆ *Observe rules for cleanliness ➔ [page 6](#).*
- ◆ *The additional fuel pump -V393- is only available as a spare part complete with the bracket.*

Removing

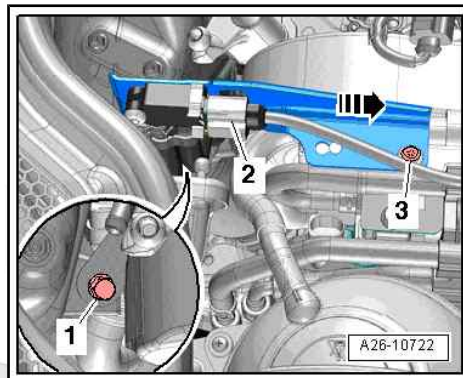
- Disconnect plug -2- at exhaust gas pressure sensor 1 -G450-.
- Screw out screw -3- and remove bracket with exhaust gas pressure sensor 1 -G450- from the bracket for the additional fuel pump in -direction of arrow-.
- Place the bracket with the exhaust gas pressure sensor 1 -G450- to the rear.



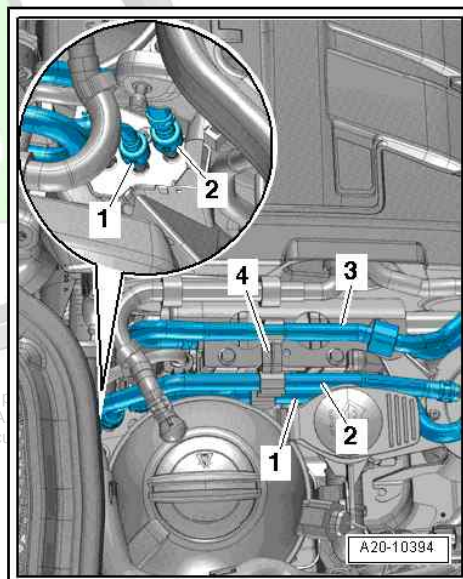
Caution

Risk of damage!

- ◆ *The exhaust gas pressure sensor 1 -G450- is very sensitive and must not touch somewhere when laying it down with the bracket.*



- Unhook the fuel hoses -1, 2, 3- on the bracket and remove the bracket -4-.



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- Disconnect plug connection -1-.
- Release screws -3 and 4- and remove bracket -2- with additional fuel pump.

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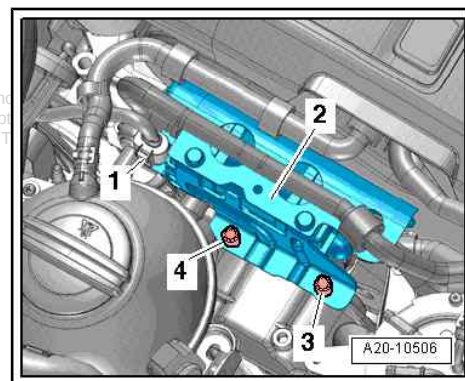
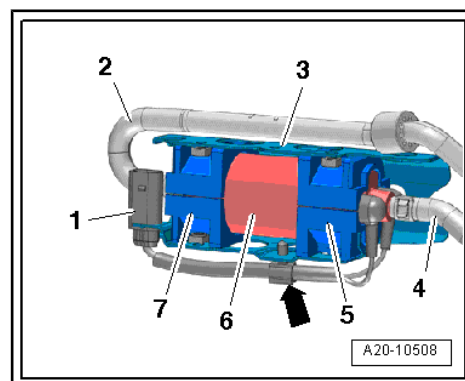
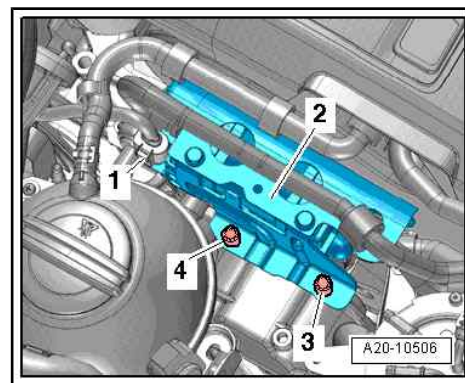
- Open the spring strap clamps and remove the fuel hoses -2 and 4-.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Tighten screws -3 and 4- to 20 Nm.
- After replacing the additional fuel pump -V393-, fill up the fuel system ⇒ [page 185](#).

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2 Accelerator control

2.1 Accelerator pedal module - Summary of components

1 - Connector

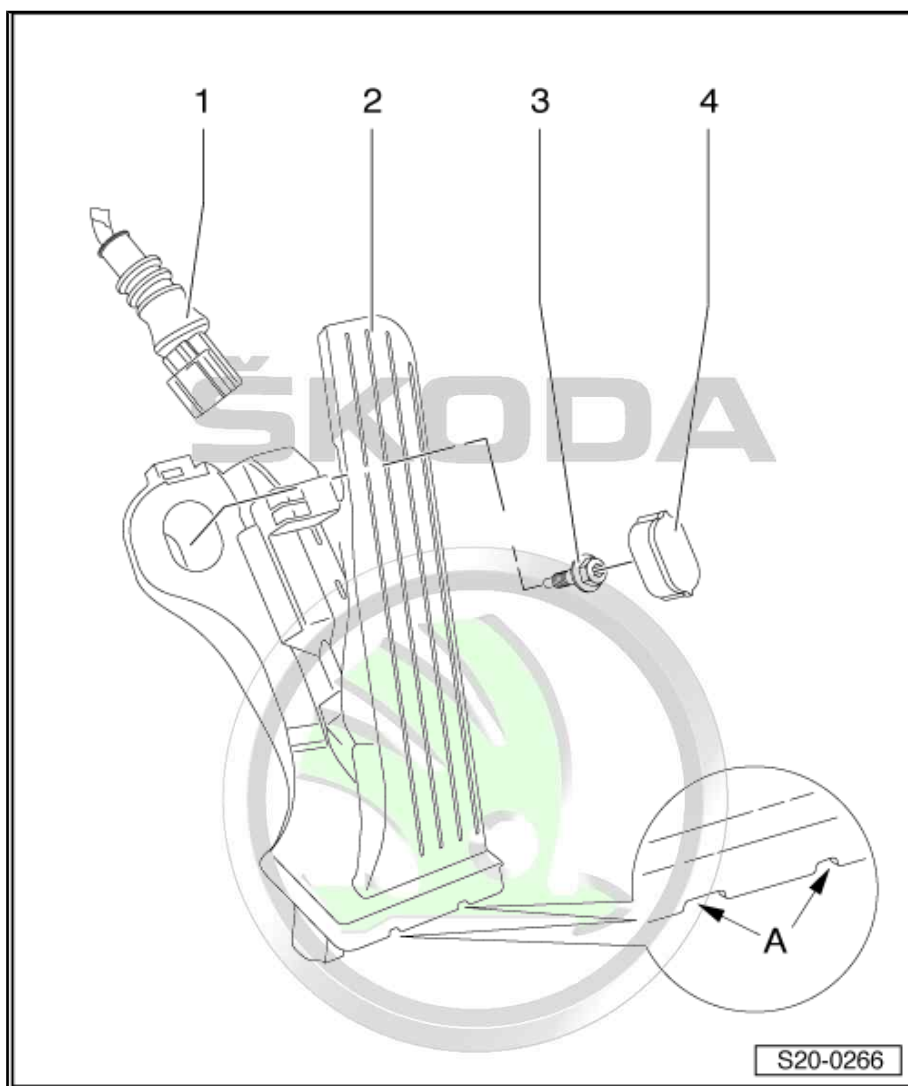
- ❑ black, 6 pin

2 - Accelerator pedal module

- ❑ with accelerator pedal position sender -G79- and accelerator pedal position sender 2 -G185-
- ❑ the sender transmits the driver's instructions to the engine control unit
- ❑ -A- openings for release tool -T10238- or -T10240-
- ❑ not adjustable
- ❑ removing and installing
⇒ [page 154](#)
- ❑ when replacing, the engine control unit must be adapted ⇒ Vehicle diagnosis, testing and information system VAS 5051 on vehicles with automatic gearbox

3 - 10 Nm

4 - Cap



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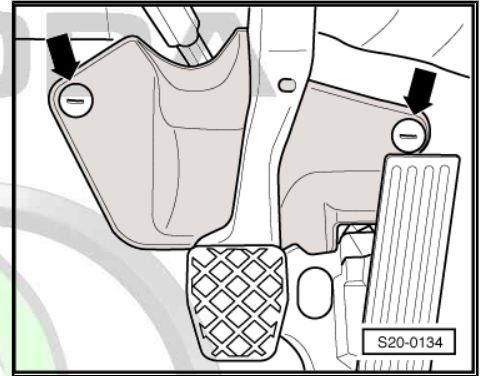
2.2 Removing and installing accelerator pedal module

Special tools and workshop equipment required

- ◆ Release tool -T10238- (for left-hand drive vehicle)
- ◆ Release tool -T10240- (for right-hand drive vehicle)

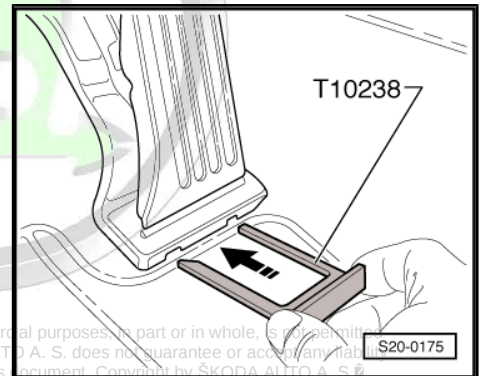
Removing

- Remove cover for the steering column -arrows-.
- Disconnect connector at accelerator pedal module
⇒ [page 156](#) .
- Lever out the cap (⇒ [page 154](#) , position 4) with a screwdriver.
- Unscrew the fixing screw (⇒ [page 154](#) , position 3).

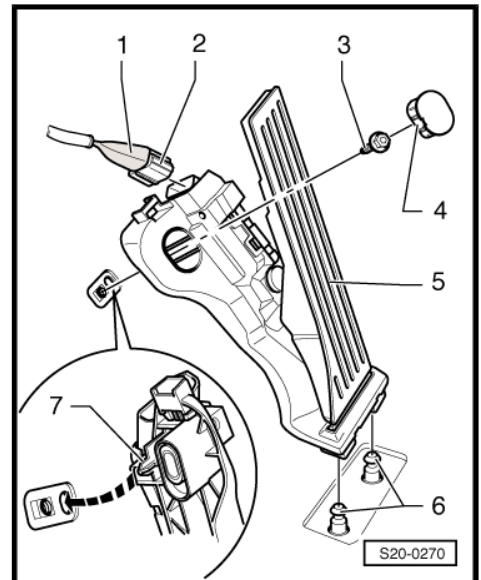


- Push the release tool -T10238- (on right-hand drive vehicles release tool -T10240 -) as shown up to the stop into the provided openings and remove the accelerator pedal module.

Install



- Fit the connector -2- onto the accelerator pedal module -5-.
- The locking of the connector must be audible.
- Push again rubber grommet -1- onto the connector -2-.
- Push accelerator pedal module onto the retaining bolts -6-.
- Insert the centering pin -7- into the hole on the underbody.
- Fasten accelerator pedal module with screw -3- (10 Nm) and fit on cap -4-.
- Re-install cover for steering column.



Note

If the accelerator pedal module was replaced on vehicles with automatic gearbox, the engine control unit must be adapted ⇒ Vehicle diagnosis, testing and information system VAS 5051.

2.3 Disconnect connector for accelerator pedal module and fit on



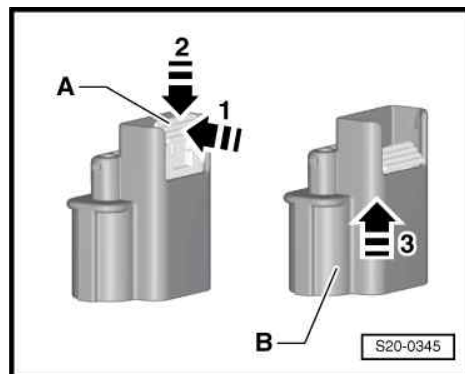
Note

The plugs for the accelerator pedal module which are inserted, must be disconnected and fit on in a different manner.

Disconnect connector 1K0 973 706

- Slightly press the piston slide valve -A- (grey) in -direction of arrow 1- and push it up to the stop in -direction of arrow 2-.
- Hold the piston slide valve in this position and disconnect the socket housing -B- in -direction of arrow 3-.

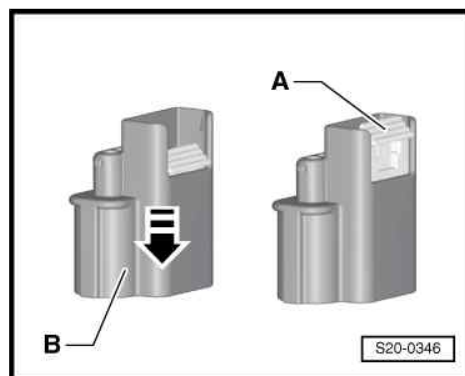
The piston slide valve -A- remains in the bottom position.



Fit on connector 1K0 973 706

- Push the socket housing -B- in -direction of arrow- until the piston slide valve can be heard to lock in place.
- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.

The piston slide valve -A- moves automatically upwards.

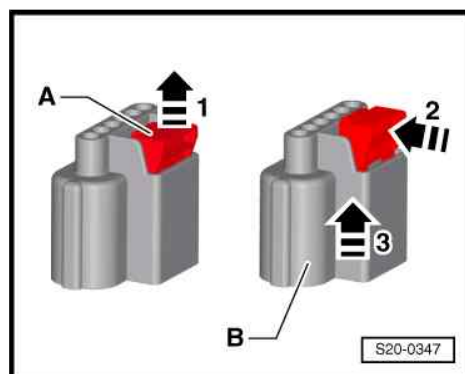


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Disconnect connector 8K0 973 706

- Pull out the piston slide valve -A- (red) up to the stop in -direction of arrow-.
- Press the piston slide valve in -direction of arrow 2- and disconnect the socket housing -B- in -direction of arrow 3-.

The piston slide valve -A- remains in the top position.

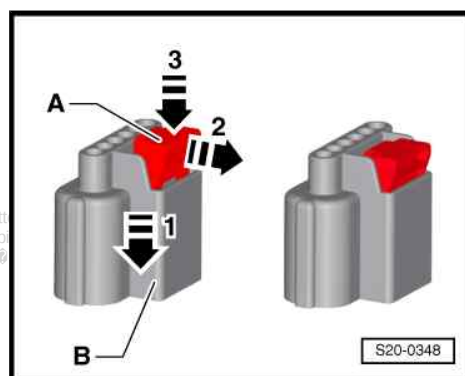


Fit on connector 8K0 973 706

- Push the socket housing -B- up to the stop in -direction of arrow 1-.
- Slightly press the piston slide valve in -direction of arrow 2- and push it in -direction of arrow 3-.

The piston slide valve -A- can only be pushed down if the socket housing was pushed up to the stop.

- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



21 – Turbocharging

1 Charge-air system - exhaust gas turbocharger

Note

- ◆ Observe rules for cleanliness ⇒ [page 6](#).
- ◆ Observe general instructions for charge-air system ⇒ [page 7](#).

1.1 Exhaust gas turbocharger with component parts - Summary of components

The exhaust turbocharger and the exhaust manifold are one component part.

1 - 10 Nm

2 - Oil feed line

- ☐ check continuity
- ☐ before installing, fill the exhaust turbocharger on the connection fitting for the oil feed line with engine oil
- ☐ Observe the mounting sequence:
 - Screw on the union nuts first of all by hand.
 - Then tighten the union nuts to 22 Nm using the socket wrench insert - T40055 - .
 - Subsequently secure the oil feed line in the brackets.

3 - Exhaust gas turbocharger

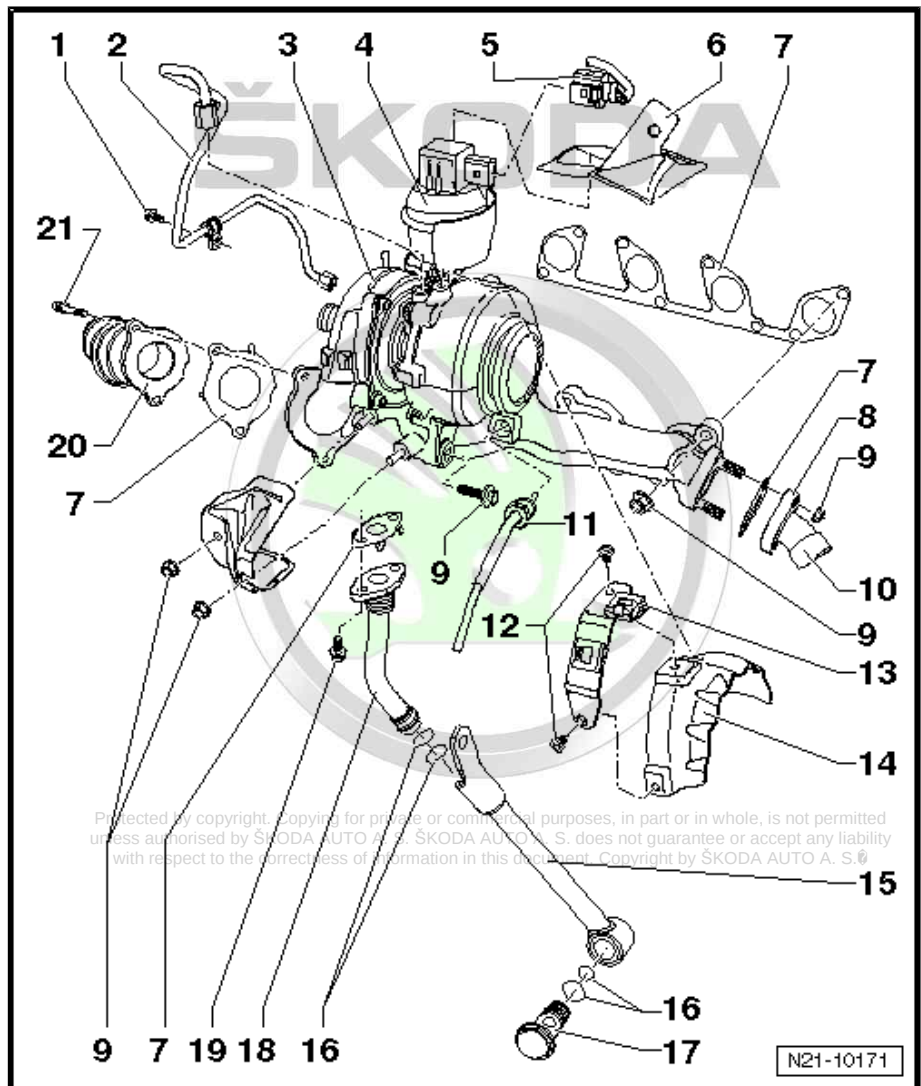
- ☐ only replace complete with exhaust manifold and vacuum setting element
- ☐ removing and installing ⇒ [page 158](#)
- ☐ Remove and install the connection pipe for the suction hose ⇒ [page 196](#)

4 - Vacuum setting element

- ☐ with position sender for charge pressure regulator -G581-

5 - Connector

- ☐ to position sender for charge pressure regulator -G581-





6 - Heat shield collar

- ☐ replace if damaged

7 - Gasket

- ☐ replace

8 - Connecting pipe

- ☐ to radiator for exhaust gas recirculation

9 - 20 Nm

- ☐ replace

10 - Connecting pipe

- ☐ to radiator for exhaust gas recirculation
- ☐ do not bend or over-tension

11 - Exhaust gas temperature sender 1 -G235- (Temperature sender upstream turbocharger -G507-)

- ☐ 45 Nm
- ☐ the thread of new temperature senders must be coated with assembly paste
- ☐ grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.
- ☐ removing and installing ⇒ [page 162](#)

12 - 10 Nm

13 - Support

- ☐ for oil feed line

14 - Heat shield

15 - Support

- ☐ between turbocharger and the cylinder block

16 - Sealing ring

- ☐ replace

17 - Hollow screw, 60 Nm

- ☐ replace

18 - Oil return pipe

19 - 15 Nm

20 - Pulsation dampener

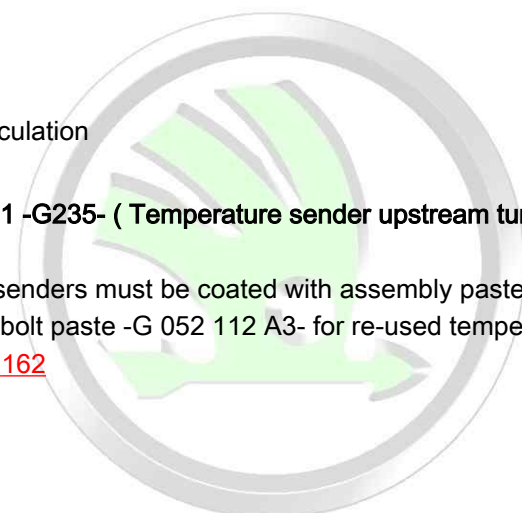
21 - 10 Nm

1.2 Removing and installing exhaust gas turbocharger

Special tools and workshop equipment required

- ◆ Pliers for spring strap clamps

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Removing



Caution

In case of mechanical damage to the exhaust gas turbocharger, e.g. damage of the compressor wheel, it is not sufficient to only replace the exhaust gas turbocharger. In order to prevent consequential damage to the engine, perform the following tasks:

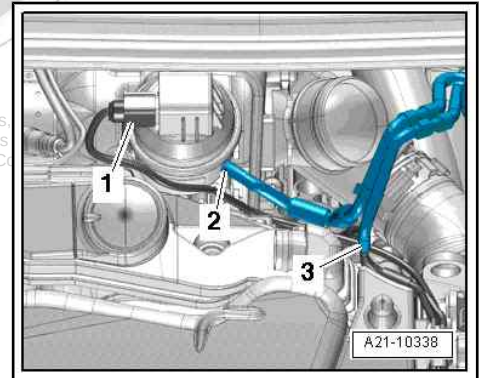
- ◆ *Clean all oil lines.*
- ◆ *Change the engine oil and replace the oil filter*
- ◆ *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- ◆ *Check all air guides and charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.



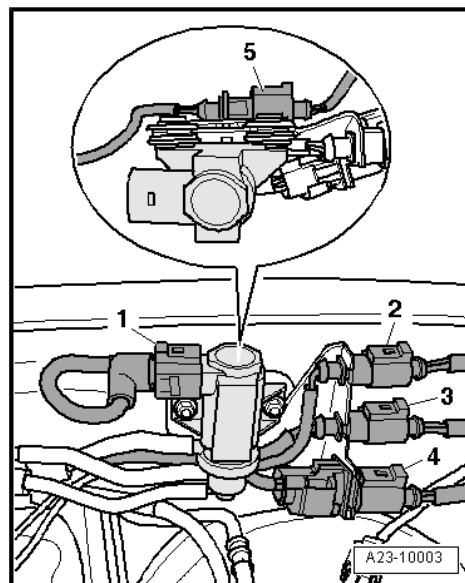
Note

- ◆ *Observe rules for cleanliness ⇒ [page 6](#).*
- ◆ *Observe general instructions for charge-air system ⇒ [page 7](#).*
- Remove pre-exhaust pipe with diesel particle filter ⇒ [page 203](#).
- Remove air filter housing with air mass meter -G70- and intake hose ⇒ [page 196](#).
- Remove the heat shield collar and disconnect the plug -1- on the position sender for charge pressure regulator -G581-.
- Detach vacuum hose -2- from vacuum setting element of the exhaust turbocharger.
- Disconnect vacuum hose -3-.

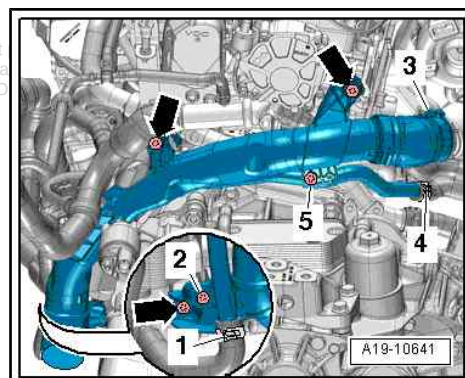




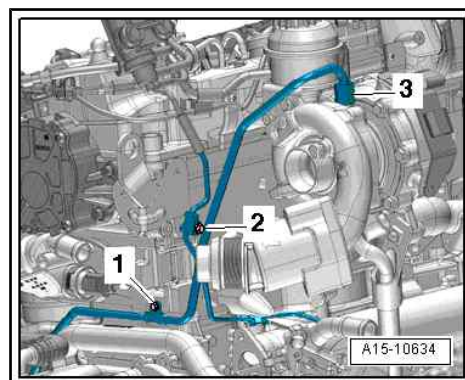
- Disconnect plug connection -3- for exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) and expose electrical cable.
- Remove fan shroud with radiator ⇒ [page 132](#).



- Unscrew screws -2 and 5- and screws -arrows-.
- Release screw clamp -3- and remove left charge air pipe.



- Unscrew the oil feed line from the connection on the exhaust gas turbocharger. To do so, counterhold on the hexagon using an open-end wrench and slacken the union nut -3-.

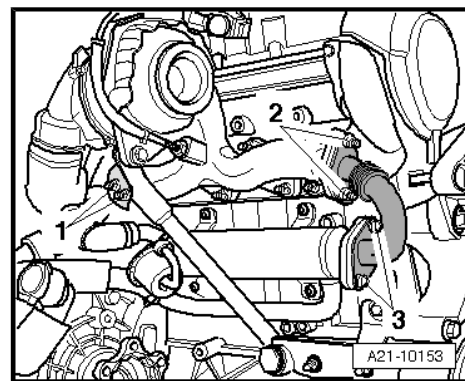


- Release nuts -1- and remove heat shield from exhaust manifold.
- Release nuts -2- and screws -3- and remove the pipe for exhaust gas recirculation.

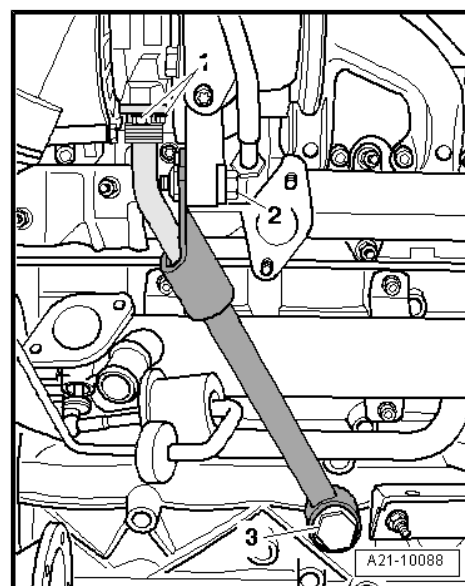


Caution

The exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) covers the top bolted connection of the support for exhaust turbocharger and must not be bent. For this reason it must be removed.



- Remove exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) ⇒ [page 162](#) .
- Release screws -1 and 2- and hollow screw -3-.
- Remove support for exhaust turbocharger with oil return line.



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- Unscrew the nuts -arrows- and remove the exhaust gas turbocharger with exhaust manifold from the cylinder head.
- Remove exhaust turbocharger with exhaust manifold downwards, to do so slightly push the engine/gearbox assembly to the front.

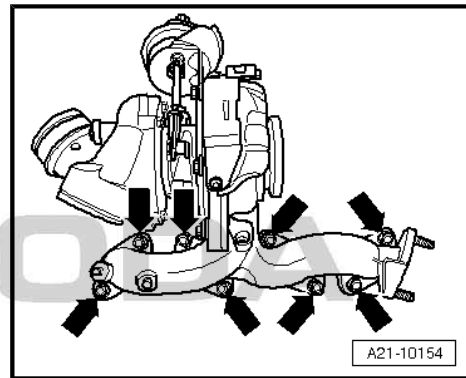
Install

Installation is performed in the reverse order, pay attention to the following points:



Note

- ♦ Replace the gaskets, the sealing rings and the self-locking nuts.
- ♦ Fill exhaust turbocharger with engine oil through the connection fitting of the oil feed line.
- ♦ For this step, observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 169](#).
- ♦ Remove oil and grease from the charge air pipes and hoses and from their connections before installing.
- ♦ Secure all hose connections with corresponding hose clips.
- ♦ Tightening torques: ⇒ [page 157](#)
- Checking the oil level ⇒ Maintenance ; Octavia II .



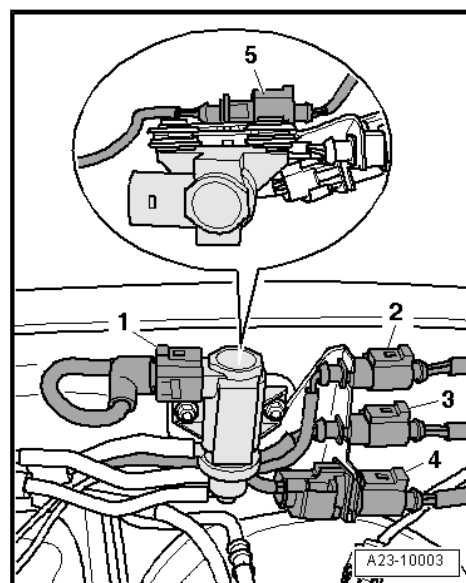
Note

After installing the turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the turbocharger.

1.3 Removing and installing exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-)

Removing

- Disconnect plug connection -3- for exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-) and expose electrical cable.



- Unscrew exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507 -) -1- from the exhaust manifold.

Install

Installation is performed in the reverse order, pay attention to the following points:

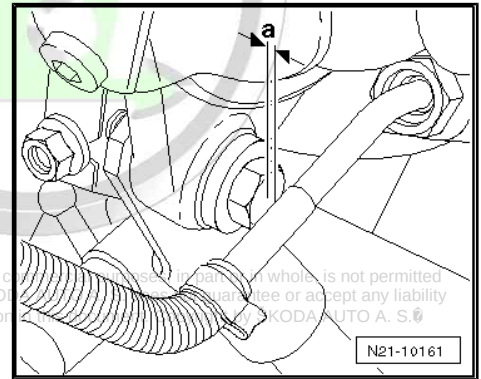
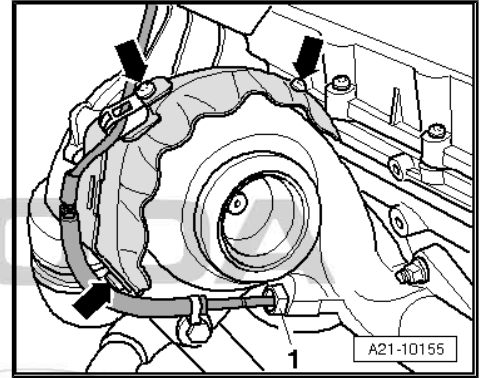


Note

- ◆ *The thread of new temperature senders must be coated with assembly paste.*
- ◆ *Grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.*
- ◆ *All cable straps should be fitted on again in the same place when installing.*

Fitting position of the exhaust gas temperature sender 1 -G235- (temperature sender upstream turbocharger -G507-):

- The dimension -a- between the sender shaft and the screw for the support for exhaust gas turbocharger must not be less than 5 mm.
- ◆ Tightening torque: 45 Nm.



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1.4 Connection diagram for vacuum hoses



1 - Vacuum setting element

- ☐ at exhaust gas turbo-charger
- ☐ with position sender for charge pressure regulator -G581-

2 - Solenoid valve for charge pressure control -N75-

3 - Silencer

4 - Air filter housing

5 - To the brake servo unit

6 - Connecting piece

- ☐ on the vacuum pump

7 - Non-return valve

- ☐ Check fitting position

8 - Changeover valve for radiator of exhaust gas recirculation -N345-

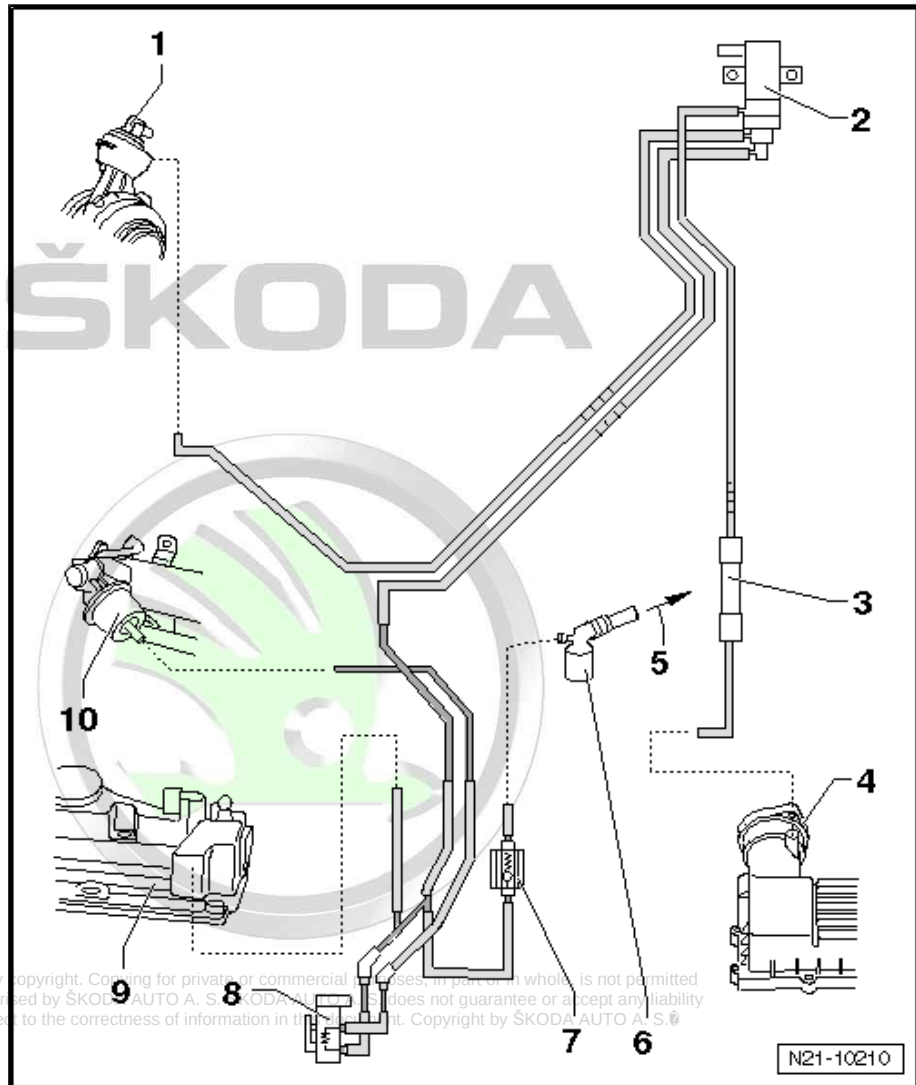
- ☐ Check change-over
⇒ [page 212](#)

9 - Vacuum reservoir

- ☐ in the cylinder head cover

10 - Vacuum setting element

- ☐ for changeover of radiator for exhaust gas recirculation



1.5 Inspect the vacuum system



Caution

When routing the vacuum lines, make sure that the lines are not kinked, twisted or crimped. Otherwise this can lead to breakdown.

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-
- Remove engine cover ⇒ [page 17](#) .

Check supply line, vacuum reservoir and non-return valve:

- Unclip the changeover valve for radiator of exhaust gas recirculation -N345- from the front bracket on the intake manifold.

- Detach the vacuum hose on the bottom connection -arrow in part I- from the changeover valve for radiator of exhaust gas recirculation -N345- and from the charge pressure control solenoid valve -N75- -arrow in part II-.
- Close off the open hose ends with suitable dummy plugs.

i Note

Do not use any thread screws or thread bolts.

- Detach the vacuum hose -arrow- on the connecting piece of the vacuum pump.

- Attach the hand vacuum pump -VAS 6213- on the detached hose and generate a vacuum of 0.06 MPa (0.6 bar).
- Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.
- The vacuum must not drop.

If the vacuum drops:

- Search for the damage or a leaky connection in the hose line and replace the piece of the hose.

If the vacuum does not drop:

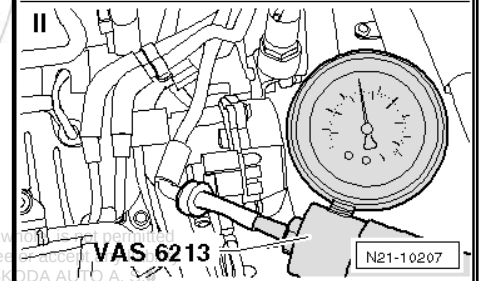
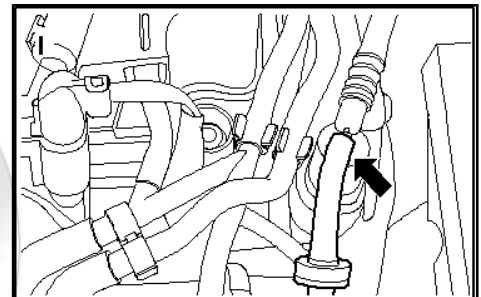
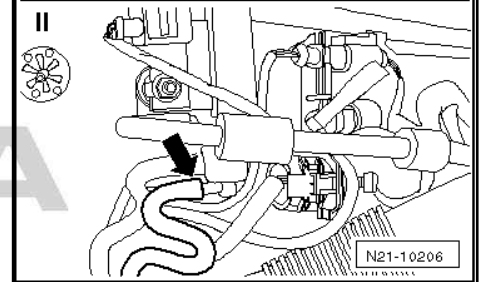
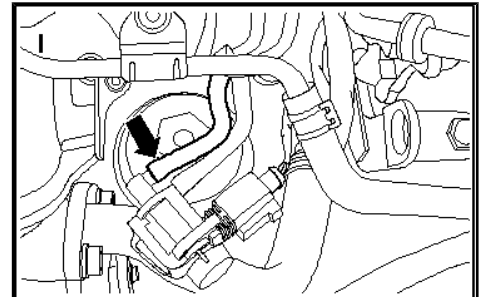
- First of all detach the hose at the hand vacuum pump -VAS 6213- .
- Remove one of the dummy plugs from the hose ends.

If the non-return valve is functional, a significant spluttering can now be heard when the vacuum is suctioned off in the vacuum reservoir.

If no spluttering can be heard:

- Replace the non-return valve.
- Re-connect all vacuum hoses.

Check the control line to the exhaust turbocharger:





- Detach the hose on the middle connection -arrow in I- of the charge pressure control solenoid valve -N75- and on the vacuum setting element of the exhaust turbocharger -arrow in II-.
- Close one opening of the hose with a suitable dummy plug.



Note

Do not use any thread screws or thread bolts.

- Attach the hand vacuum pump -VAS 6213- to the other end of the hose and generate a vacuum of 0.06 MPa (0.6 bar).
- Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.
- The vacuum must not drop.

If the vacuum drops:

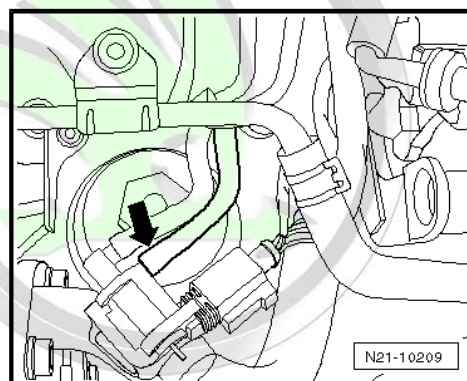
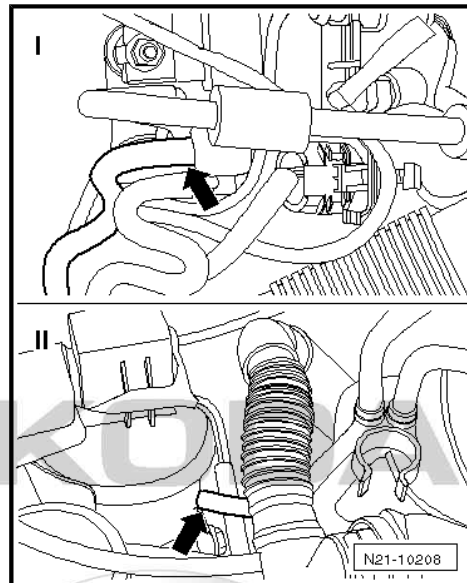
- Replace the vacuum hose.

Check the control line to the vacuum setting element for switching over the radiator for the exhaust gas recirculation:

- Detach the hose on the middle connection of the exhaust gas recirculation radiator change-over valve -N345- -arrow-.
- Attach the hand vacuum pump -VAS 6213- on the detached hose and generate a vacuum of 0.06 MPa (0.6 bar).
- Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.
- The vacuum must not drop.

If the pressure drops:

- Detach the vacuum hose on the vacuum setting element for switching over the radiator for the exhaust gas recirculation.
- Attach the hand vacuum pump -VAS 6213- with the factory-delivered test hose on the vacuum setting element and generate a vacuum of 0.06 MPa (0.6 bar).



Note

- ♦ *The adjustment on the vacuum setting element must be recognizable and the vacuum must not drop. If this is not indicated, replace the radiator for the exhaust gas recirculation ⇒ [page 211](#).*
- ♦ *If no defect can be found on the vacuum setting element, replace the vacuum line of the changeover valve for radiator of exhaust gas recirculation -N345-.*

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2 Charge-air system - radiator, leak-tightness

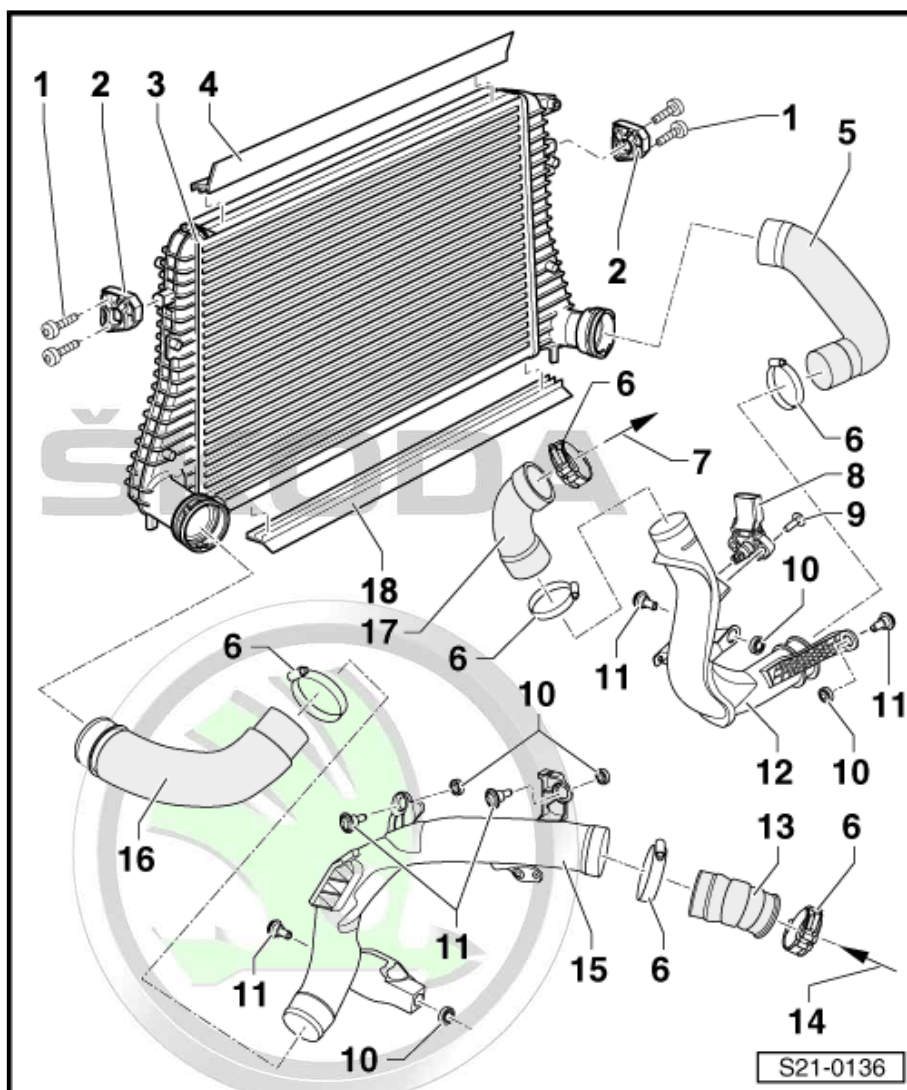
2.1 Charge air cooling - Summary of components



Note

Observe general instructions for charge-air system ⇒ [page 7](#).

- 1 - 5 Nm
- 2 - Support
 - ☐ Check fitting position
- 3 - Charge air cooler
 - ☐ removing and installing ⇒ [page 167](#)
- 4 - top seal
 - ☐ placed onto charge air cooler
- 5 - Right charge air hose
- 6 - Screw clamp, 6 Nm
- 7 - to throttle valve control unit -J338-
- 8 - Charge pressure sender - G31- with intake air temperature sender -G42-
- 9 - 3 Nm
- 10 - Rubber grommet
 - ☐ replace if damaged
- 11 - 8 Nm
- 12 - Right charge air pipe
- 13 - Connecting hose
- 14 - from exhaust turbocharger
- 15 - Left charge air pipe
- 16 - Left charge air hose
- 17 - Connecting hose
- 18 - bottom seal
 - ☐ placed onto charge air cooler



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2.2 Removing and installing charge air cooler

Removing

- Remove coolant radiator ⇒ [page 132](#).
- Remove front bumper ⇒ Body Work; Rep. Gr. 63.



- Remove the charge air hoses on the left and right from the charge air cooler.

On vehicles with air conditioning



WARNING

Refrigerant circuit of the air conditioning system must not be opened.



Caution

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

- Release the securing bolts -arrows- of the condenser.

For all vehicles

- Unscrew fixing screws ➔ [Item 1 \(page 167\)](#) for charge air cooler on right and left side ➔ [page 167](#).

On vehicles with air conditioning

- Press off the charge air cooler from the lock carrier with the assistance of a 2nd mechanic so that the screw -1- for attaching the pipes of the air conditioning system is accessible.
- Remove screw -1-.

For all vehicles

- Carefully remove radiator downwards.

Install

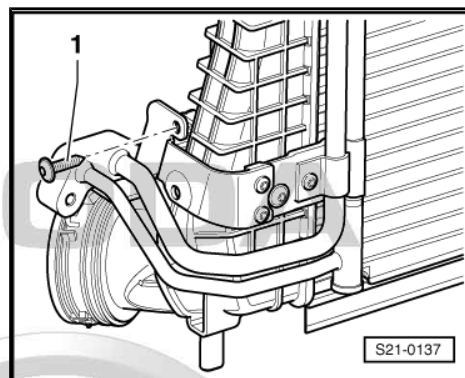
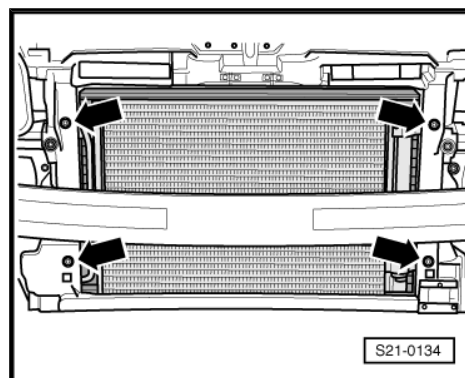
Installation is performed in the reverse order, pay attention to the following points:



Note

Replace O-rings.

- Observe the assembly instruction for hose connections with push-fit couplings ➔ [page 169](#).



2.3 Hose connections

2.3.1 Assembly of hose connections with push-fit couplings



Caution

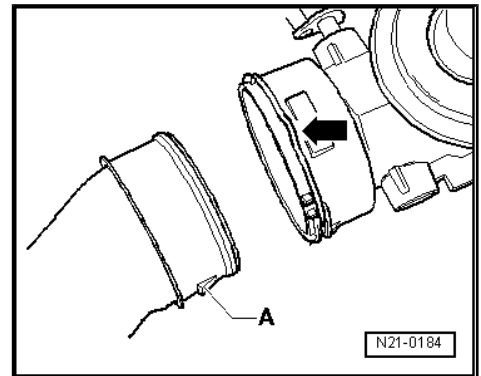
The gasket ring for the push-fit coupling can be damaged, if the locking clip is in the lock position during the assembly. This could result in a leakage. Observe the assembly instruction.

Removing

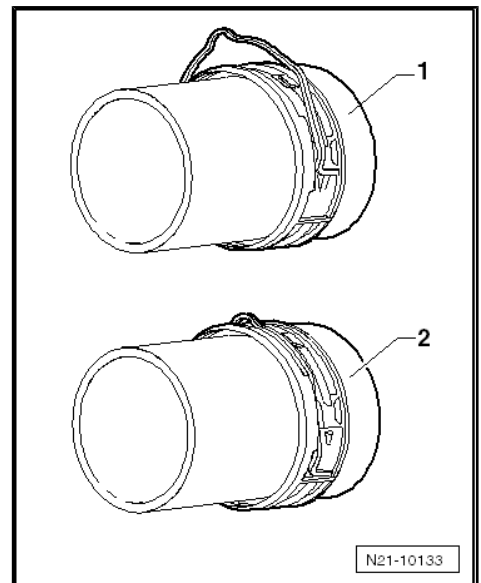
- Release push-fit coupling by pulling the locking clip -arrow-. Disconnect hose/pipe without auxiliary tool.

Install

- When replacing the gasket ring, place the gasket ring in the groove of the charge air hose. Make sure that the gasket ring is fully seated all round in the groove.
- Oil the sealing surface and the gasket ring.



- Put the locking clip into the release position -1-.
- Push the charge air hose up to the stop into the coupling.
- Put the locking clip into the lock position -2- and then press down once again the charge air hose.
- Check for correct seating and the correct locking in place of the push-fit coupling by pulling on the hose.



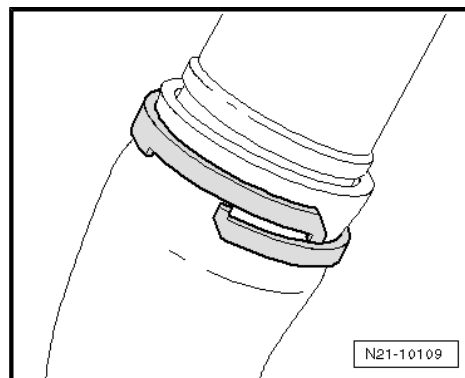
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2.3.2 Hose connections with spring strap ring



Note

After disassembling and assembling the charge air hoses with spring strap clamps, there is a risk of the "hose slipping off" when driving. For this reason, spring strap rings are installed, which can only be opened when there is a defect of the relevant charge air hose. When carrying out repairs, the spring strap ring must be destroyed using a suitable tool and replaced by a spare part according to the ➔ Electronic Catalogue of Original Parts.



2.4 Checking the charge-air system for leaktightness

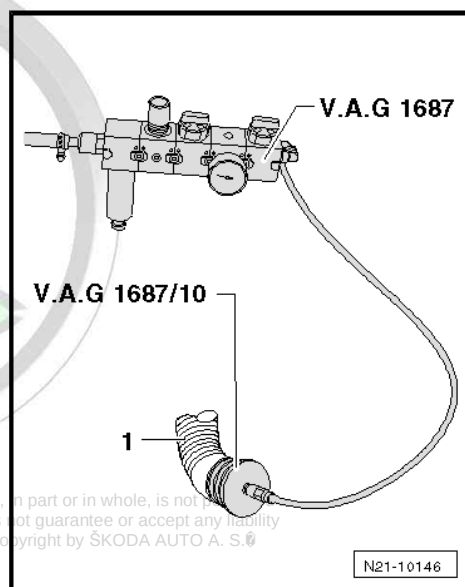
Special tools and workshop equipment required

- ◆ Charge-air system testing device, e. g. -V.A.G 1687-
- ◆ Adapter, e.g. -V.A.G 1687/10-

Test sequence

- Remove the suction hose -1- from the air filter housing.
- Fit adapter -1687/10- into the suction hose -1- and secure with a clamp.

Prepare tester for charge air system -V.A.G 1687- as follows:

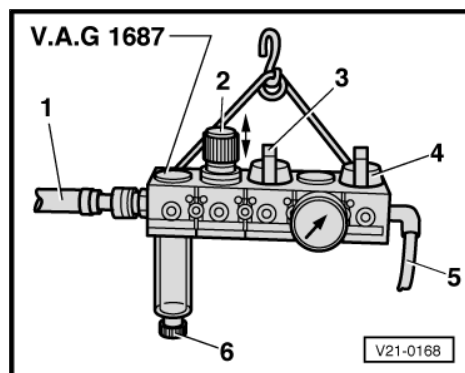


- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.



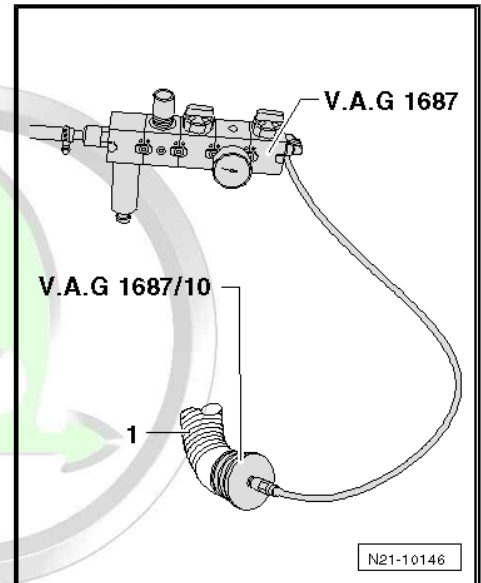
Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.





- Connect tester for charge air system - V.A.G 1687- as shown to adapter -1687/10- .
- Connect the pneumatic hose -1- (pneumatic support) at tester.



Note

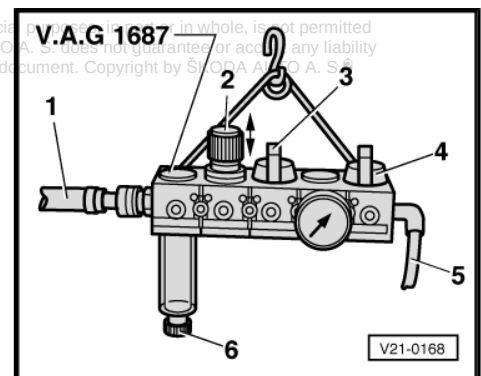
If there is water in the transparent water drain reservoir, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.



Caution

The pressure must not be greater than 0.05 MPa (0.5 bar)! A too high pressure can damage the engine.



- Open valve -4- and wait until the test circuit is filled. If necessary regulate the pressure to 0.05 MPa (0.5 bar).
- Listen to, touch or use commercially available leak search spray or the ultrasonic measuring device e. g. -V.A.G 1842- to check the charge-air system with exhaust gas turbocharger for leak points.



Note

- ◆ *Minor leaks are permissible on the suction side of the turbo-charger, because the intake hoses are not designed for over-pressure.*
- ◆ *A small amount of air escapes via the valves into the engine. For this reason no pressure test is possible.*
- ◆ *Use of ultrasonic measuring device -V.A.G 1842- → operating instructions .*
- ◆ *In case of a leak point, observe the instructions for charge air system ⇒ [page 7](#) during the installation.*
- ◆ *Before removing the adapter, depressurize the test circuit by detaching the coupling from the adapter -1687/10- .*



23 – Fuel Formation, Injection

1 Diesel direct injection system - fitting location, system overview

The control unit is equipped with a fault memory. Before repairs, setting operations and fault finding, interrogate the fault memory and execute a self-diagnosis ⇒ Vehicle diagnosis, testing and information system VAS 5051.



Note

- ♦ *Faults can be detected by the control unit as checking and adjustment work is being undertaken and then saved. It is therefore absolutely necessary to delete the fault memory after completing all checking and adjustment work ⇒ Vehicle diagnosis, testing and information system VAS 5051*
- ♦ *Observe safety precautions when working on the diesel direct injection system ⇒ [page 5](#).*

1.1 Overview of fitting locations

1 - Exhaust gas pressure sensor 1 -G450-

2 - Hall sender -G40- (cam-shaft position sensor)

3 - lambda probe -G39- with heating for lambda probe -Z19-

4 - Engine control unit

5 - Injection units (Piezo injectors)

6 - Position sender for charge pressure regulator -G581-

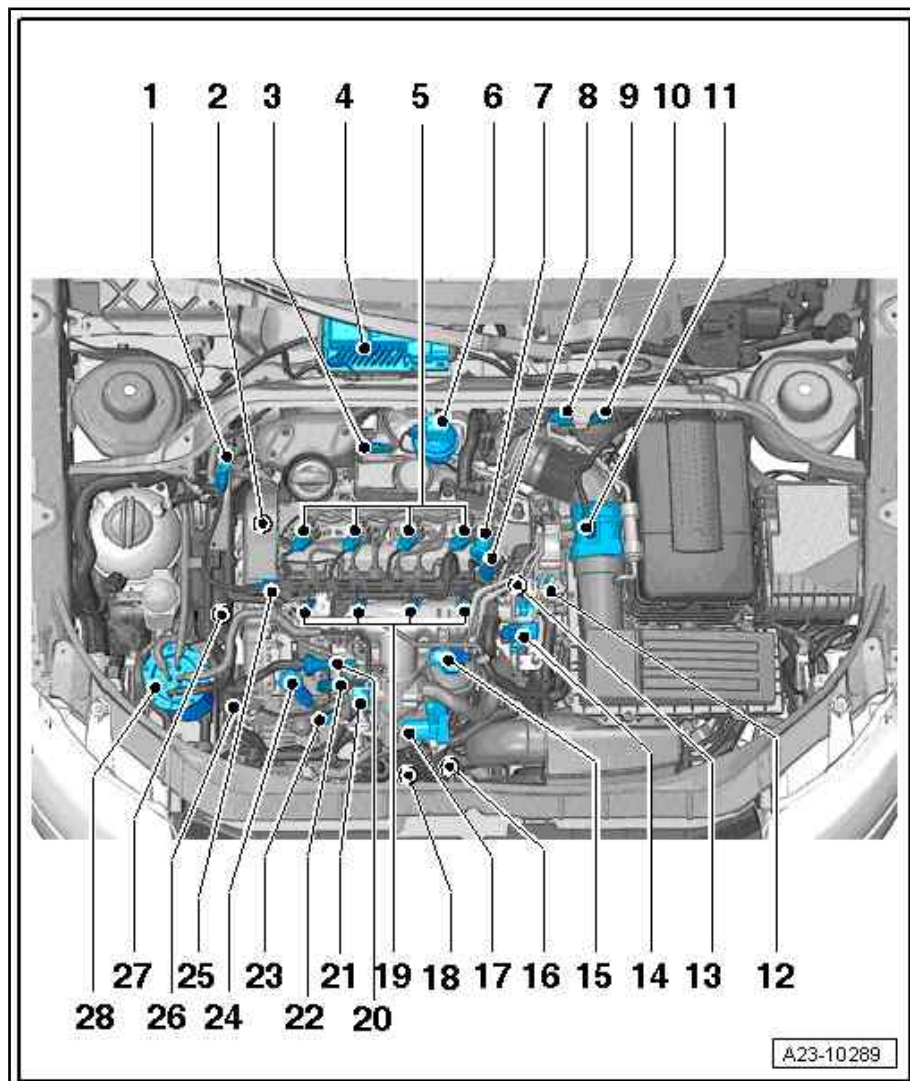
7 - Pressure holding valve

8 - Control valve for fuel pressure -N276-

9 - Solenoid valve for charge pressure control -N75-

10 - Connector

- ☐ for exhaust gas temperature sender 4 -G648-
- ☐ for exhaust gas temperature sender 1 - G235- (Temperature sender upstream turbocharger - G507-)
- ☐ for lambda probe -G39-



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11 - Air mass meter -G70-

12 - Coolant temperature sender -G62-

13 - Engine speed sender -G28-

- ☐ removing and installing
⇒ [page 174](#)

14 - Intake manifold flap motor -V157-

15 - Changeover valve for radiator of exhaust gas recirculation -N345-

16 - Coolant recirculation pump 2 -V178-

17 - Throttle valve control unit -J338-

18 - Charge pressure sender -G31-

19 - Glow plugs

- ☐ Glow plug 1 -Q10-
- ☐ Glow plug 2 -Q11-
- ☐ Glow plug 3 -Q12-
- ☐ Glow plug 4 -Q13-

20 - Fuel temperature sender -G81-

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- ☐ consists of:

- ◆ mechanical valve (electrically operated)
- ◆ EGR control motor -V338-
- ◆ EGR potentiometer -G212-

22 - Connection of fuel feed line from fuel filter

23 - Connection of fuel feed line (high pressure line)

24 - Fuel high pressure pump with fuel dosage valve -N290-

25 - Fuel pressure sender -G247-

26 - Coolant temperature sender at radiator outlet -G83-

27 - Additional fuel pump -V393-

28 - Fuel filter

1.2 System - Overview



WARNING

It is essential to pay attention to the safety precautions when working on the diesel direct injection system ➔ [page 5](#).

1 - Fuel dosage valve -N290-

- ☐ do not open

2 - Fuel high pressure pump

- ☐ removing and installing
➔ [page 183](#)

3 - Fuel pressure sender - G247-

- ☐ removing and installing
➔ [page 181](#)

4 - High pressure reservoir (rail)

5 - Control valve for fuel pressure -N276-

- ☐ removing and installing
➔ [page 189](#)
- ☐ check ➔ [page 188](#)

6 - Injection unit (Piezo injector)

- ☐ removing and installing
➔ [page 178](#)

7 - Fuel return-flow line with pressure holding valve

- ☐ The pressure holding valve has the function to always hold a remaining pressure (control quantity) of approx. 1 MPa (10 bar) in the fuel return-flow line. The injection units (piezo injectors) require this control quantity for their function.

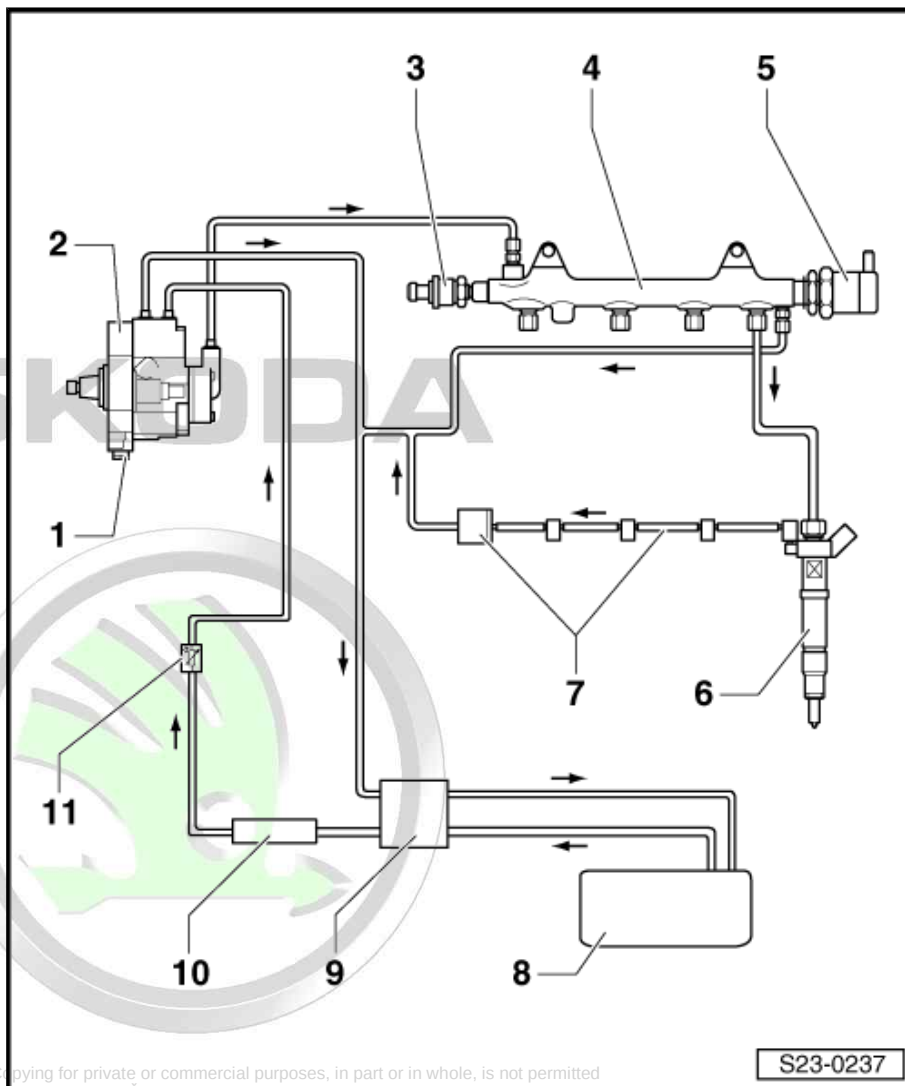
- ☐ check ➔ [page 187](#)

8 - Fuel tank

9 - Fuel filter

10 - Additional fuel pump -V393-

11 - Filter housing with fuel temperature sender -G81-



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1.3 Removing and installing engine speed sender -G28-

Special tools and workshop equipment required

- ◆ Hose clamps up to $\varnothing$ 25 mm -MP7-602 (3094) -
- ◆ Assembly tool -T10118-

- ◆ Socket insert, 4mm -T10370-

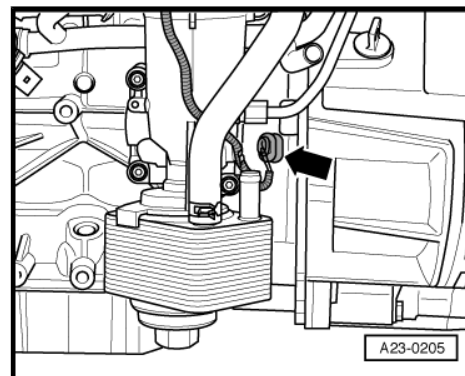
Removing

- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Press together the coolant hoses at the engine oil cooler with one hose clamp each and remove the coolant hoses.
- Remove the oil filter holder ⇒ [page 99](#) .
- Remove the plug -arrow- on the engine speed sender -G28- with the assembly device -T10118 - and lay the electrical cable to the side.



Note

To unlock the plug without using the assembly tool -T10118- , the unlock button must be pressed at the plug using the screwdriver and at the same time raise the unlock button with a thin wire hook.



- Unscrew fixing screw -2- for engine speed sender -G28- -1- with socket insert, 4mm -T10370- .

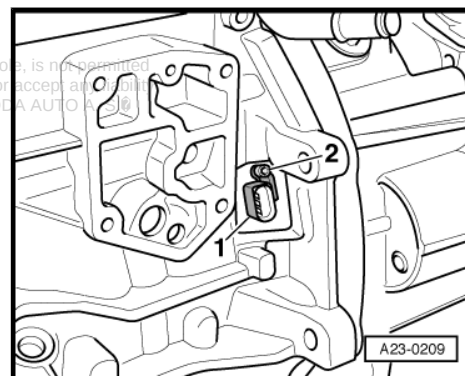
Install

Installation is performed in the reverse order, pay attention to the following points:

- Install the oil filter holder ⇒ [page 99](#) .

Tightening torque

Component	Nm
Engine speed sender -G28- on the flange	5



2 Fuel system, engine side

2.1 Fuel system - Summary of components



Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following points must be observed:

1 - Fuel return-flow line with pressure holding valve

- ☐ The pressure holding valve must only be renewed complete with the fuel return-flow line.
- ☐ After an exchange, the engine must run at idling speed for approx. 2 minutes in order to vent the fuel system.
- ☐ Check the pressure holding valve
⇒ [page 187](#).

2 - 8 Nm

3 - Fuel return-flow line

4 - Fuel return-flow hose

- ☐ to fuel filter
- ☐ blue marking
- ☐ pay attention to correct position

5 - High pressure lines, 25 Nm

- ☐ between the high pressure reservoir (rail) and the injection units
- ☐ do not interchange
- ☐ do not change bending form
- ☐ when installing a new injection unit, also replace the high pressure line
- ☐ install free of stress

6 - Fuel pressure regulating valve -N276-, 80 Nm

- ☐ not reusable
- ☐ replace ⇒ [page 189](#)

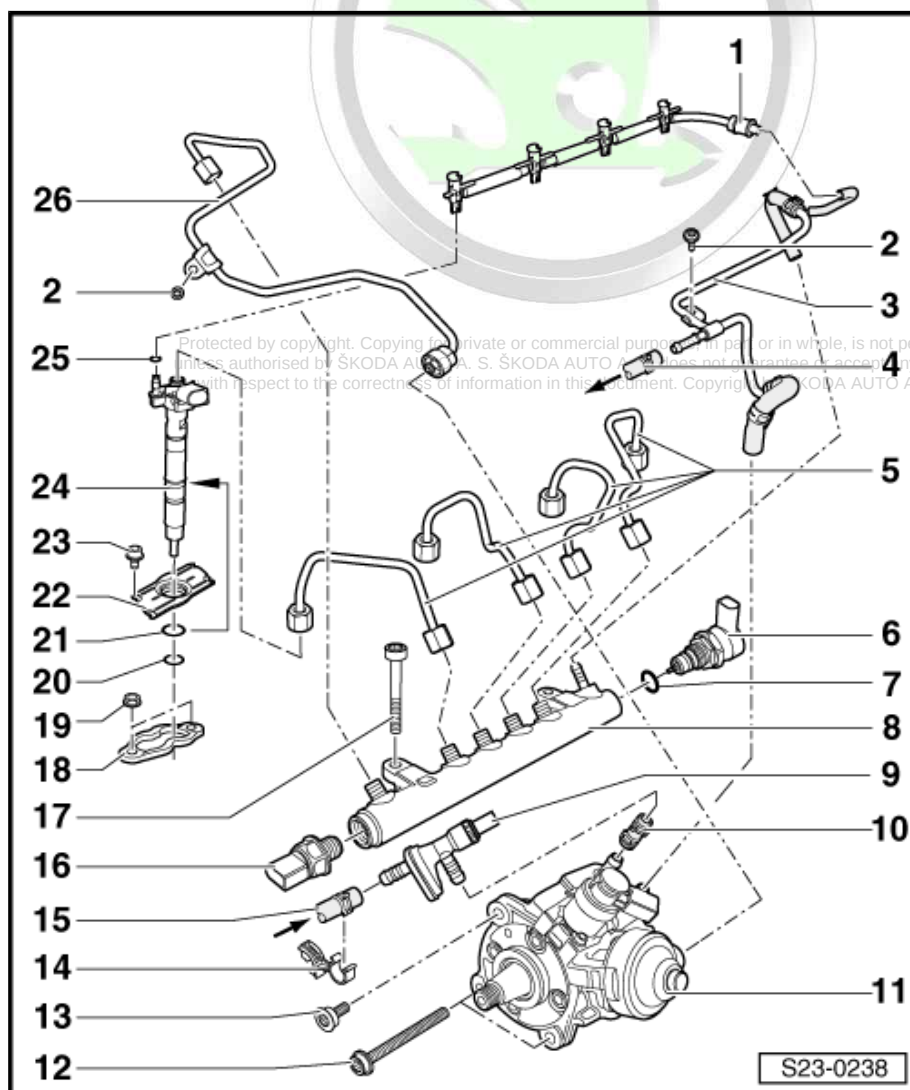
7 - O-ring

- ☐ replace

8 - High pressure reservoir (rail)

9 - Filter housing with fuel temperature sender -G81-

- ☐ Do not unscrew the fuel temperature sender -G81-, only replace completely





- ☐ If the fuel temperature sender -G81- was inadvertently slackened, it must be tightened again to 2.5 Nm.

10 - Fuel intake hose

- ☐ white marking
- ☐ pay attention to correct position

11 - High pressure pump

- ☐ removing and installing ⇒ [page 183](#)

12 - 20 Nm + torque a further 180° (1/2 turn)

- ☐ replace

13 - 20 Nm + torque a further 45° (1/8 turn)

- ☐ replace

14 - Support

- ☐ for fuel temperature sender -G81-

15 - Fuel intake hose

- ☐ white marking
- ☐ pay attention to correct position
- ☐ of the additional fuel pump -V393-

16 - Fuel pressure sender -G247- , 100 Nm

- ☐ reusable
- ☐ removing and installing ⇒ [page 181](#)



Caution

*Do not slacken or tighten
the fuel pressure sender
using the open-end
wrench or the open ring
spanner - Risk of dam-
age!*

*Use lengthened socket
insert.*

17 - 22 Nm

18 - Clamping claw

- ☐ replace
- ☐ pay attention to correct installation position ⇒ [page 178](#)

19 - 10 Nm

20 - Copper seal

- ☐ replace

21 - O-ring

- ☐ for channel in cylinder head
- ☐ replace

22 - Cover for injection unit

23 - 5 Nm

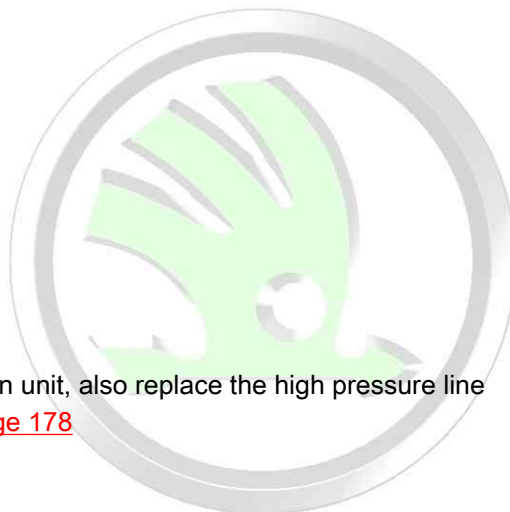
24 - Injection unit (Piezo injector)

- ☐ when installing a new injection unit, also replace the high pressure line
- ☐ removing and installing ⇒ [page 178](#)

25 - O-ring

- ☐ for return-flow line

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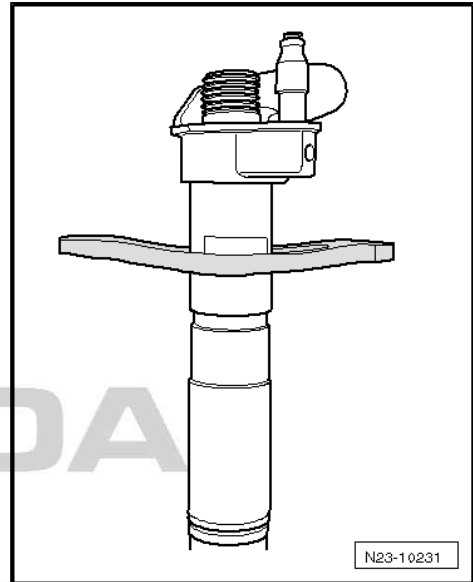


- ☐ replace

26 - High pressure line, 25 Nm

- ☐ between high pressure pump and high pressure reservoir (rail)

Fitting position of the clamping claw



2.2 Remove and install injection unit (Piezo injector)

Special tools and workshop equipment required

- ◆ Extractor -T10055-
- ◆ Assembly sleeve -T10377-
- ◆ Socket insert -T40055-

2.2.1 Removing

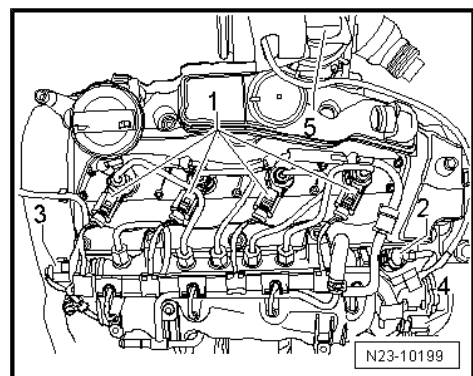


Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).

- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).

- Remove engine cover ⇒ [page 17](#).
- Take out the noise insulation at the injection units.
- Disconnect the plug -1- at the injection units to be removed.



- Disconnect the connections of the fuel return-flow line at the injection units to be removed. Pull them upwards to unlock.

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Note

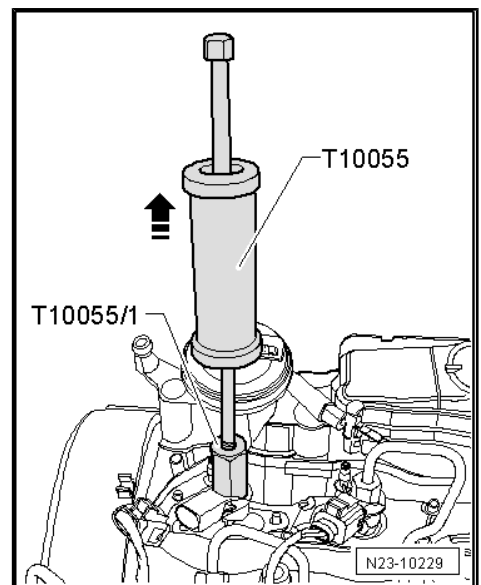
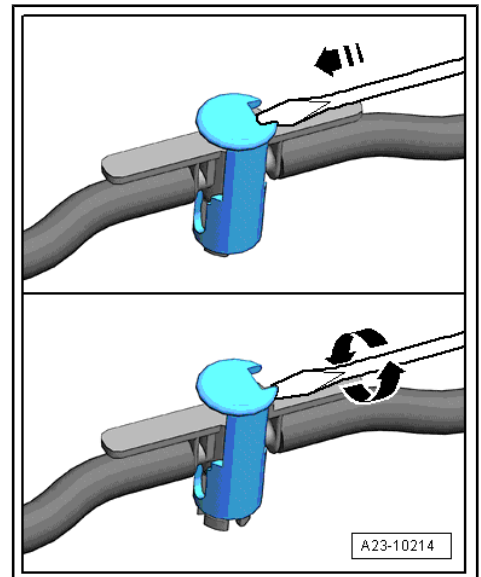
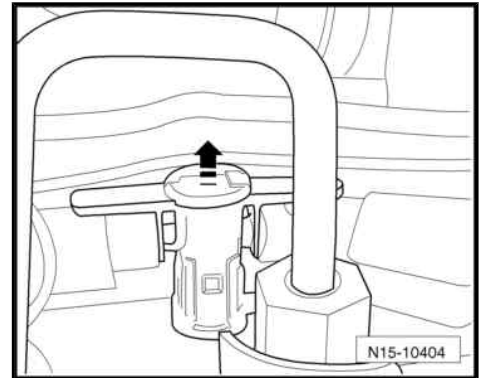
- ◆ *If the return line connection cannot be pulled upwards, open the connection by turning it with a narrow screwdriver.*
- ◆ *Pay attention to cleanliness, no dirt must get into the removed return lines and the connections of the injection units.*
- Unscrew the high pressure line between the high pressure reservoir and the injection units to be removed.
- Unscrew the screws of the cover for the injection units to be removed.
- Slightly raise the cover and turn it by 90° in order to expose the fixing nuts of the injection unit.



Caution

When turning the fixing nuts of the injection unit, there is a risk that the relevant nut falls into the cylinder head. Pay particular attention in order to avoid unnecessary installation work or consequential damage.

- Unscrew the fixing nuts of the corresponding injection unit.
- Fit on the extractor -T10055- with the adapter -T10055/1- as shown and pull out the injection unit towards the top by tapping it.





2.2.2 Install

Important instructions for installing the injection units:

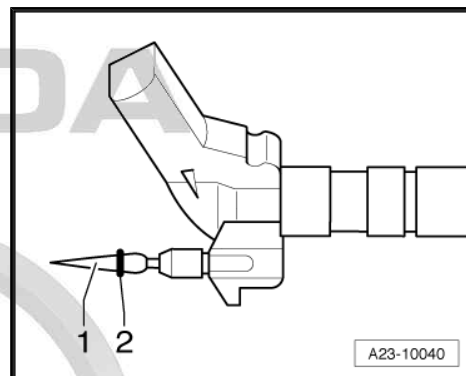
- List of parts and seals or O-rings to be replaced:
 - Clamping claw
 - Copper seal
 - O-ring for channel in cylinder head
 - O-ring for fuel return-flow line
 - Only for new injection unit: injection line
- When reinstalling, only insert injection units and injection lines for the same cylinder in the cylinder head.
- Check the injection units and the fitting positions for cleanliness before installing.
- The injection units must not show any sign of damage.
- All the O-rings must be coated with engine oil before installing.

If a used injection unit is reinstalled:

- Spray the tip of the injection unit with a rust solvent spray. Remove the soot particles or the oil particles with a cloth after approx. 5 minutes.
- For disassembling the old copper gasket ring from the injection unit, carefully tighten the gasket ring in a vice until the copper gasket ring is prevented from spinning between the chuck jaws. Pull the injection unit out of the copper gasket ring with slight turning and pulling movements of the hand.

Continued for all injection units

- Install the new copper gasket ring with the aid of a plastic bush.
- In order to avoid damaging the O-ring, slide the new O-ring -2- for the fuel return-flow line over the drift pin -1-.
- Clean the channel with a cloth soaked in engine oil or rust solvent in order to remove the soot particles on the contact surface of the injection unit in the cylinder head. At the same time do not damage the contact surface.

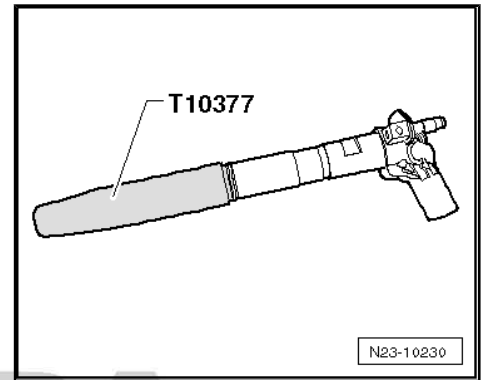


- Replace the O-ring for the channel in the cylinder head, to do so use the assembly sleeve -T10377- .
- Slide on the cover for the injection unit.
- Slide the clamping claw onto the injection unit, observe its fitting position ⇒ [page 178](#) .
- Insert the injection unit into the channel.



Caution

When turning the fixing nuts of the injection unit, there is a risk that the relevant nut falls into the cylinder head. Pay particular attention in order to avoid unnecessary installation work or consequential damage.



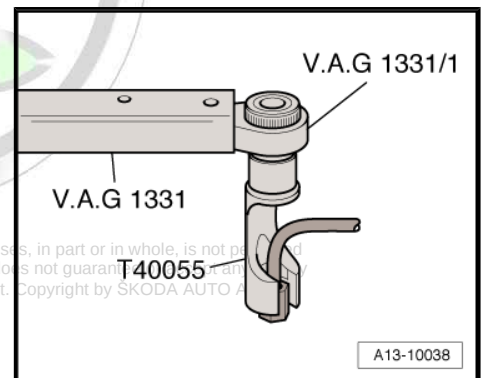
Tightening torques: ⇒ [page 176](#)

- Carefully fit on the fixing nuts of the clamping claw by hand and tighten them.
- Turn the cover of the injection units on its fitting position and screw it down.
- First of all tighten the union nuts of the high-pressure or injection lines by hand.
- Ensure that the high-pressure lines or the injection lines are positioned stress-free.
- To tighten the injection lines, use the hinged wrench SW 17 - T40055- .
- Carefully push the connections of the fuel return-flow line over the O-ring on the injection unit (check the O-ring for damage beforehand). The cap must click audibly into place, afterwards carefully press the unlocking bolt downwards.



Note

After replacing one or several injection units, the "injector quantity adjustment (IQA)" and the "injector voltage adjustment (IVA)" must be indicated in the engine control unit for the new injection units ⇒ Vehicle diagnosis, testing and information system VAS 5051.



- Fill up the fuel system ⇒ [page 185](#) .

2.3 Removing and installing fuel pressure sender -G247-

The fuel pressure sender -G247- (rail pressure sensor) is located in the high pressure reservoir, it measures the current fuel pressure in the high pressure system and delivers a voltage signal to the engine control unit - J623- .

If the sender fails, the pressure regulation is controlled by the engine control unit via a characteristic diagram (in the emergency running mode, the maximum engine speed is limited to approx. 3000 rpm).

Special tools and workshop equipment required

- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Protective goggles and gloves



Removing



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Observe rules for cleanliness* ⇒ [page 6](#) .
- Remove engine cover ⇒ [page 17](#) .



WARNING

Wear protective gloves and protective goggles when working with grease remover!

- Before removing, clean the thread area around the fuel pressure sender -G247- with a grease remover (no dirt must get into the hole of the high pressure reservoir (rail)).



Note

No grease remover must get into the plug connection, carefully clean.

- Dry the fuel pressure sender -G247- .
- Disconnect the plug from the fuel pressure sender -G247- .

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Caution

Do not slacken the fuel pressure sender using the open-end wrench or the open ring spanner - Risk of damage!

Use lengthened socket insert.

- Unscrew the fuel pressure sender -G247- .
- Suction the dirt out of the high pressure reservoir hole (thread and contact surface). To do so do not use any mechanical tools.



Note

Close the high pressure reservoir hole immediately with a suitable screw plug in order to prevent dirt from penetrating.

Install



Note

- ◆ The fuel pressure sender -G247- has no gasket ring but a biting edge for sealing.
- ◆ Pay attention to damage of the sealing surfaces (biting edge seal) and the thread of the fuel pressure sender -G247-. It is possible to use the fuel pressure sender -G247- again.
- ◆ Also check the sealing surface on the high pressure reservoir hole.



Caution

Do not tighten the fuel pressure sender using the open-end wrench or the open ring spanner - Risk of damage!

Use lengthened socket insert.

- Tighten the fuel pressure sender -G247- by hand.
- Tighten the sender.
Tightening torque: [⇒ page 176](#)
- Check fuel system for tightness [⇒ page 186](#).

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Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2.4 Removing and installing the high pressure pump

Special tools and workshop equipment required

- ◆ Counterholder -T10051 -
- ◆ Extractor -T40064-
- ◆ Thrust piece -T40064/1-

Removing



Note

- ◆ **Safety precautions when working on the fuel supply system**
[⇒ page 3](#).
- ◆ Observe rules for cleanliness [⇒ page 6](#).
- Remove the toothed belt from the camshaft and the high pressure pump [⇒ page 37](#).

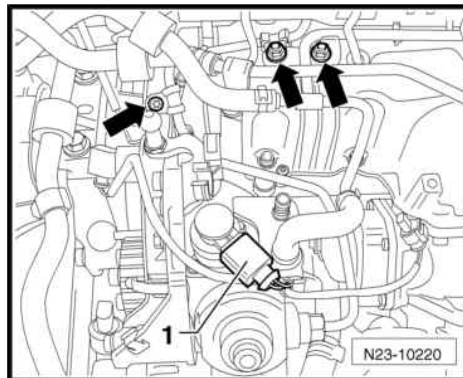
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- Disconnect the plug connection -1- and unscrew the screws -arrows-.
- Unclip the wiring loom from the wiring guide of the pencil type glow plugs.

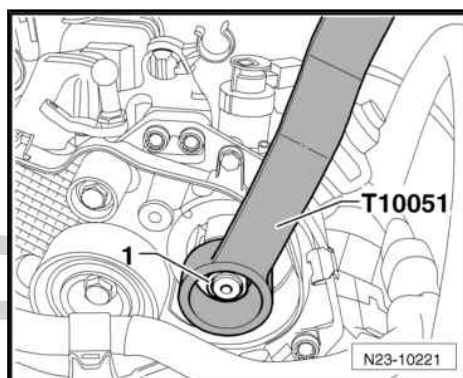
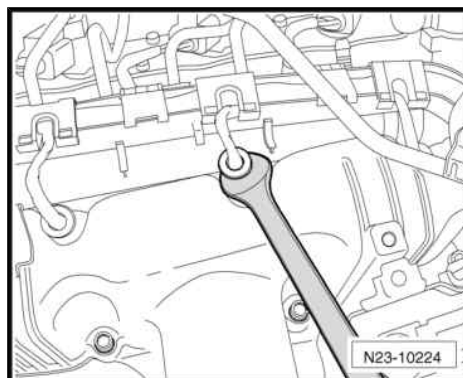


Caution

- ♦ *Carefully disconnect the plug from the pencil type glow plugs.*
- ♦ *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*



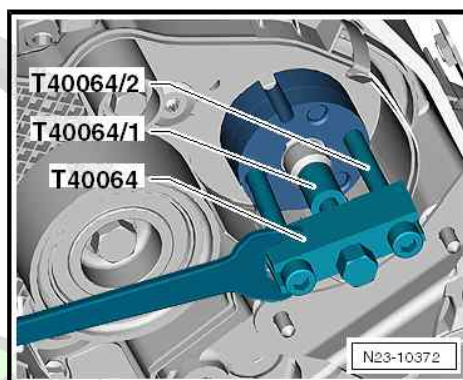
- Carefully remove the plugs from the pencil type glow plugs. During this process, support using an open-end wrench SW 11.
- Release the fixing screws of the coolant line on the intake manifold and lay the coolant line to the side.
- Detach the fuel return-flow line at the high pressure pump.
- Detach the fuel return-flow line on the high pressure reservoir (rail) and lay it to the side.
- Remove the fuel return-flow line between the high pressure pump and the high pressure reservoir (rail).
- Remove the timing belt gear from the high pressure pump.
- Hold the hub of the high pressure pump with the counterholder -T10051- and unscrew the securing nut -1-.



Note

Replace the basic pressure plate with the pressure plate -T40064/1- on the extractor -T40064-.

- Position extractor -T40064- with thrust piece -T40064/1 - and cylinder head screws (bolts) -T40064/2- as shown.
- Detach the hub of the high pressure pump, if necessary counterhold with lateral wrench SW 24.



- Unscrew fixing screws -arrows- of high pressure pump.
- Remove the high pressure pump.

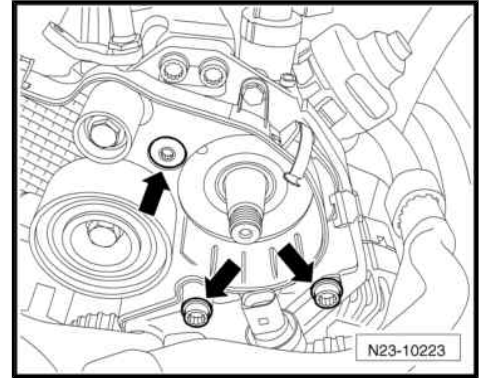
Install



Caution

Risk of damage to the high pressure pump through running dry.

- ◆ ***After reinstalling the high pressure pump: carry out the basic setting "test of fuel pump for predelivery" "3 times" before the first engine start ⇒ Vehicle diagnosis, testing and information system VAS 5051.***
- ◆ ***After installing a new high pressure pump: fill up the high pressure pump with fuel before the first engine start ⇒ [page 185](#).***



Installation is performed in the reverse order, pay attention to the following points:



Note

The screws for the high pressure pump must be replaced.

Tightening torques: ⇒ [page 176](#)

2.5 Filling/bleeding the high pressure pump and the fuel system

Special tools and workshop equipment required

- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Vehicle diagnosis, measurement and information system - VAS 505X-



Caution

Risk of damage to the high pressure pump through running dry.

- ◆ ***After installing a new high pressure pump, the high pressure pump must be filled up with fuel before the first engine start. Avoid the high pressure pump to run dry.***



Note

- ◆ ***When installing the high pressure pump, ensure that no dirt penetrates the fuel system.***
- ◆ ***Only remove the screw plug immediately before installing the fuel lines.***
- On vehicles with automatic gearbox the selector lever must be in position "P".
- The vehicle must be filled up.
- Temperature of the fuel system ≥ 15 °C.

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In order to fill up the high pressure pump with fuel, proceed as follows:

- Connect vehicle diagnosis, measurement and information system -VAS 505X- .
- Switch on ignition.
- Select the “engine electronics” in the self-diagnosis.
- Then select “006 - Basic setting”.
- Then select “Test of fuel pump for predelivery”.
- Subsequently press on “Start”.

◆ The fuel pumps start running for approx. 60 seconds.

- Repeat this work procedure 3x.

This ensures that the high pressure pump is adequately filled up with fuel.

- Degrease the union nuts of the high pressure line (Pos. 26 ⇒ [page 176](#)) and their surrounding area at the high pressure pump and at the fuel high pressure reservoir.
- Start the engine and let it run at an average speed for a few minutes.
- Carry out a visual inspection of the fuel system for leaks after switching off the engine.

If there is leakage despite the correct tightening torque:

- Replace the related component part and repeat the filling/bleeding procedure.
- Afterwards, carry out a test drive with at least one full load acceleration.
- Afterwards, once again carry out a visual inspection of the fuel system for leaks.

If there is leakage despite the correct tightening torque:

- Replace the related component part and repeat the filling/bleeding procedure.
- Interrogate and if necessary erase fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.
- Check readiness code, if necessary re-generate ⇒ Vehicle diagnosis, testing and information system VAS 5051.

2.6 Check the fuel system for tightness

Special tools and workshop equipment required

- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Vehicle diagnosis, measurement and information system -VAS 505X-
- Degrease all fuel connections.
- Let the engine run at idling speed for a few minutes.
- Carry out a visual inspection of the complete fuel system for leaks after switching off the engine.

If there is leakage despite the correct tightening torque:

- Replace the related component part and repeat the procedure.
- Afterwards, carry out a test drive with at least one full load acceleration.

- Then once again carry out a visual inspection of the complete fuel system for leaks.

If there is leakage despite the correct tightening torque:

- Replace the related component part and repeat the procedure.
- Interrogate and if necessary erase fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

 Note

After deleting the fault memory of the engine control unit the readiness code ⇒ Vehicle diagnosis, testing and information system VAS 5051 must be checked, if necessary re-generated.

2.7 Check the pressure holding valve in the fuel return-flow line

The pressure holding valve in the fuel return-flow line has the function to always hold a remaining pressure (control quantity) of approx. 1 MPa (10 bar).

The injection units (piezo injectors) require this control quantity for their function.

Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -V.A.S 6330 -
- ◆ Adapter , e.g. -V.A.G 1318/17A-
- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Protective goggles and gloves

Test sequence

 Note

- ◆ *Safety precautions when working on the fuel supply system ⇒ [page 3](#).*
- ◆ *Observe rules for cleanliness ⇒ [page 6](#).*
- Remove engine cover ⇒ [page 17](#).



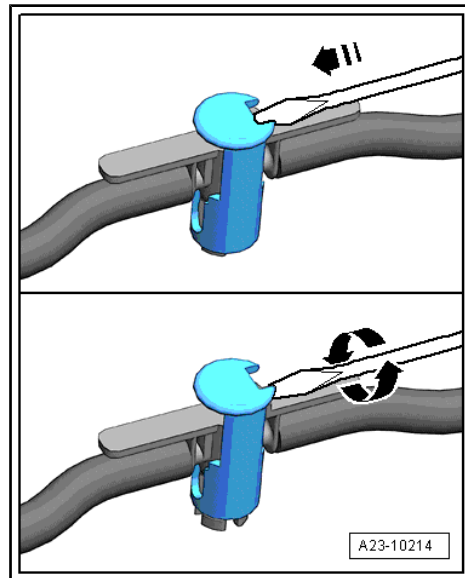
WARNING

Wear protective gloves and protective goggles when working with grease remover!

- Before removing, clean the return line connection at the injection unit from cylinder 1 with a grease remover.
- Dry the return line connection of the 1st cylinder.
- Cover the return line connection of the 1st cylinder with a cleaning cloth.
- Disconnect the return-flow line connection on the 1st cylinder, to do so pull the unlocking bolt upwards.

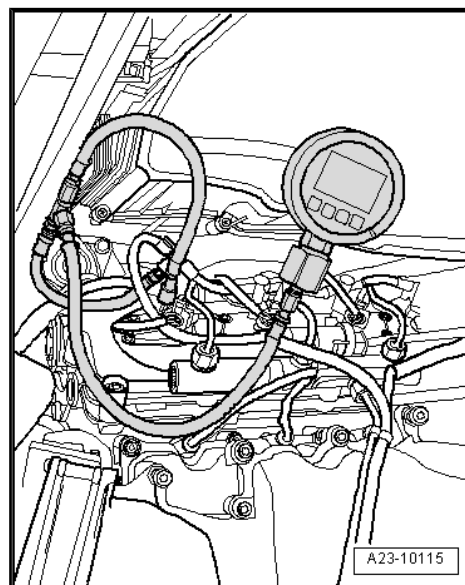
**Note**

- ◆ If the return line connection cannot be pulled upwards, open the connection by turning it with a narrow screwdriver.
- ◆ Pay attention to cleanliness, no dirt must get into the removed return lines and the connections of the injection units.



- Connect the tester for the fuel return-flow system VAS - V.A.S 6330 - between the return-flow line connection at the injection unit and the return-flow line.
- Open shut-off cock of the pressure gauge.
- Start engine and run in idle.
- Read the pressure on the pressure gauge -V.A.S 6330- .
- Specified value: 0.8 ... 1.4 MPa (8 ... 14 bar)

If the nominal value is not reached, replace the pressure holding valve.



2.8 Check fuel pressure regulating valve - N276-

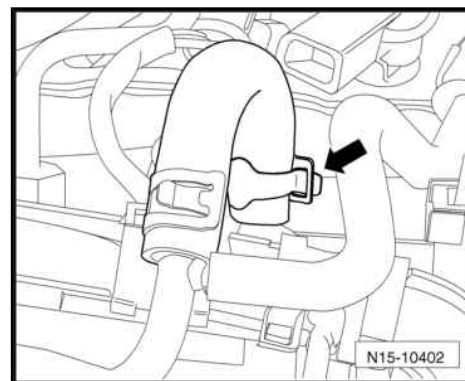
**Note**

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).

- ◆ *Observe rules for cleanliness* ⇒ [page 6](#).

- Remove engine cover ⇒ [page 17](#) .

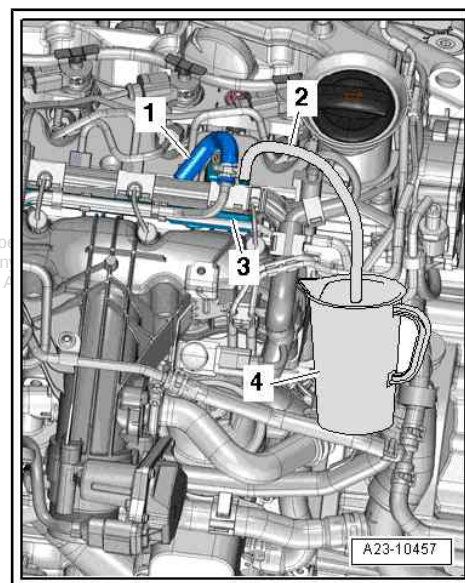
- Remove the fuel return-flow hose from the fuel high pressure reservoir, to do so slacken the hose clamp -arrow-.
- Close the detached fuel return flow hose with a suitable plug.



- Connect the auxiliary hose -2- to the return-flow connection of the fuel high pressure reservoir -3-.
- Hold the auxiliary hose in a measuring vessel -4- in order to measure the return flow quantity.
- Start engine and run for 30 seconds at idling speed.
- Specified value: 90 ... 110 ml

If the specified value is not reached, the fuel pressure regulating valve -N276- is defective.

- Replace fuel pressure regulating valve -N276- → [page 189](#) .



2.9 Replace fuel pressure regulating valve - N276-

The fuel pressure regulating valve -N276- is located in the high pressure reservoir (rail) and provides a constant pressure in the high pressure reservoir (rail) and in the injection lines (fuel high pressure circuit).

The regulating valve opens if there is too high a pressure in the fuel high pressure circle so that one part of the fuel from the high pressure reservoir returns to the fuel tank via a return-flow line.

The pressure control valve closes if there is too low a pressure in the high-pressure fuel circuit and thus seals the high-pressure side from the low-pressure side.



Note

The fuel pressure regulating valve -N276- is not reusable.

Special tools and workshop equipment required

- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Protective goggles and gloves



Removing



Note

- ♦ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ♦ *Observe rules for cleanliness* ⇒ [page 6](#) .
- Remove engine cover ⇒ [page 17](#) .



WARNING

Wear protective gloves and protective goggles when working with grease remover!

- Before removing, clean the thread area around the fuel pressure regulating valve with a grease remover (no dirt must get into the hole of the high pressure reservoir).



Note

No grease remover must get into the plug connection, carefully clean.

- Dry the fuel pressure regulating valve -N276- .
- Disconnect the plug on the fuel pressure regulating valve - N276- .
- Counterhold on the case hexagon and slacken the union nut. Afterwards release by hand.
- Suction the dirt out of the high pressure reservoir hole (thread and contact surface). To do so do not use any mechanical tools.

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Note

Close the high pressure reservoir hole immediately with a suitable screw plug in order to prevent dirt from penetrating.

Install



Note

- ◆ *The fuel pressure regulating valve -N276- does not have a gasket ring but a special sealing lip.*
- ◆ *The fuel pressure regulating valve -N276- is not reusable.*
- ◆ *The O-ring seals the high pressure area from the low pressure area in the high pressure reservoir and must be replaced.*
- ◆ *Before installing, moisten the O-ring and the hole in the high pressure reservoir with diesel fuel.*
- ◆ *Ensure that the sealing surfaces (seal with a special sealing edge) and the thread of the new fuel pressure regulating valve -N276- do not get damaged.*
- ◆ *Also check the sealing surface on the high pressure reservoir hole.*
- Tighten the union nut by hand.
- Align the fuel pressure regulating valve -N276- in such a way that the connecting line is routed draught-free after fitting on the plug.
- Counterhold on the case hexagon and tighten the union nut.
Tightening torque: ➔ [page 176](#)
- After installing, let the engine run at average speed for a few minutes and then switch off the engine again.
- Check the fuel system for tightness.
- Interrogating and erasing fault memory of engine control unit
➔ Vehicle diagnosis, testing and information system VAS 5051.
- Afterwards, carry out a test drive with at least one full load acceleration, then once again check the fuel high pressure area for tightness.
- Interrogate and erase once again the fault memory of the engine control unit ➔ Vehicle diagnosis, testing and information system VAS 5051.



Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.



3 Intake manifold, air filter

3.1 Intake manifold with component parts - Summary of components

1 - Intake manifold

- ☐ with intake manifold flap motor -V157-
- ☐ with intake air-intrinsic optimisation
- ☐ must not be disassembled
- ☐ removing and installing
⇒ [page 192](#)

2 - 8 Nm

3 - Gasket

- ☐ replace

4 - Sealing ring

- ☐ replace

5 - Connecting pipe

- ☐ to radiator for exhaust gas recirculation



Caution

Pay attention that the decoupling element of the connection pipe is not bent and therefore is not overstretched. There is a risk of crack formation.

6 - 20 Nm

- ☐ to release and tighten use socket insert - T10385-

7 - Gasket

- ☐ replace

8 - 8 Nm

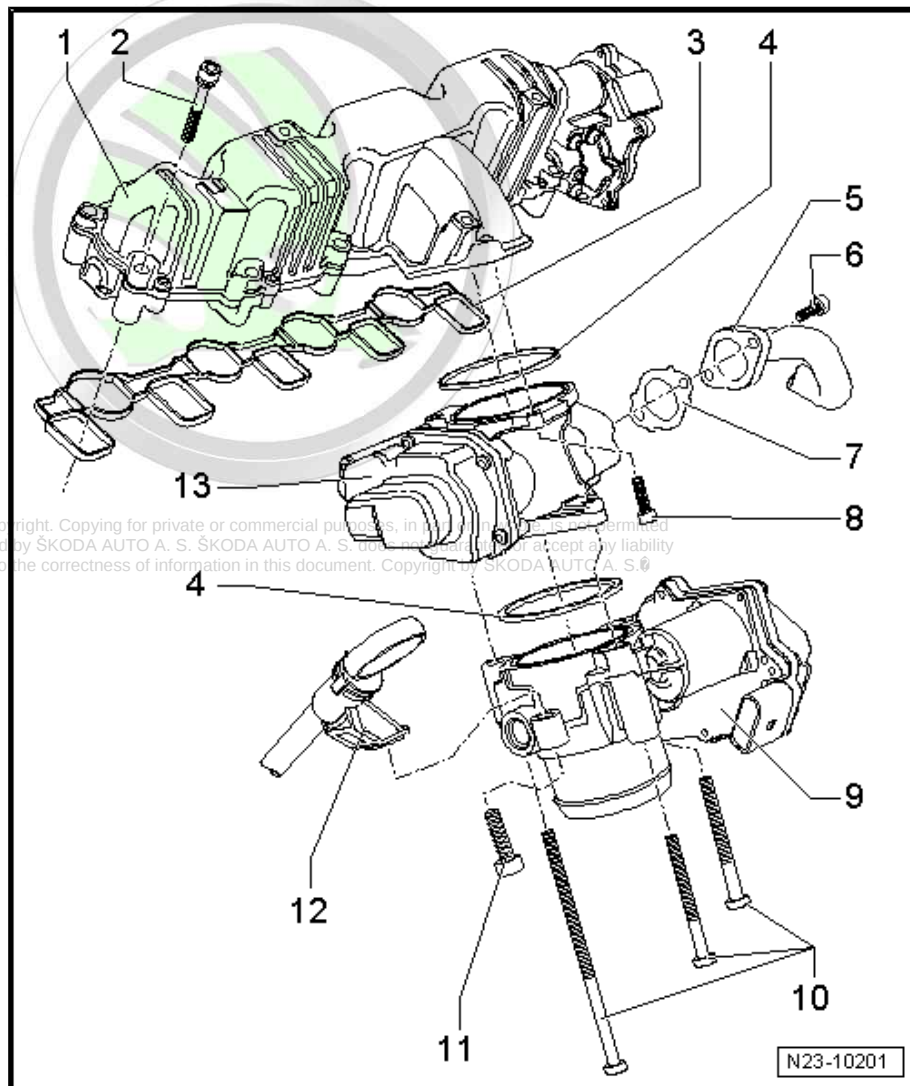
9 - Throttle valve control unit -J338-

10 - 10 Nm

11 - 10 Nm

12 - Dipstick

13 - Exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer -G212-



3.2 Removing and installing intake manifold

Special tools and workshop equipment required

- ◆ Socket insert , e.g. -T40159-

Removing



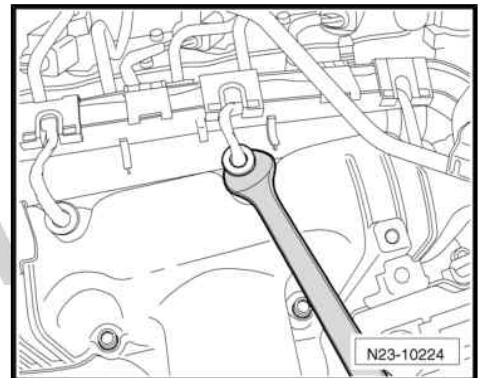
Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ *[page 6](#).*
- Remove engine cover ⇒ *[page 17](#).*
- Unclip the wiring loom from the wiring guide of the pencil type glow plugs.

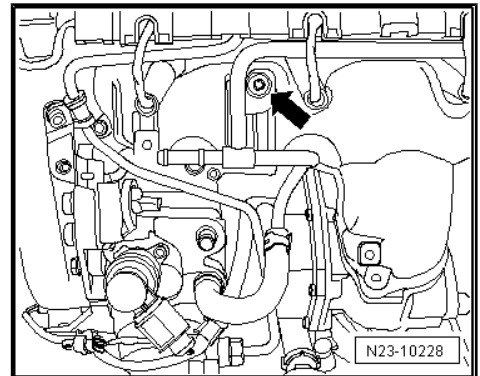


Caution

- ◆ *Carefully disconnect the plug from the pencil type glow plugs.*
 - ◆ *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*
- Carefully remove the plugs from the pencil type glow plugs. During this process, support using an open-end wrench SW 11.
 - Remove the fuel return-flow lines on the high pressure reservoir, at the injection units and at the high pressure pump.



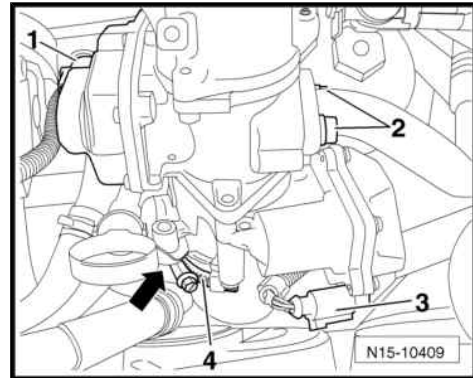
- Unscrew the fixing screw -arrow- and remove the return line.
- Remove the high pressure line between the high pressure pump and the high pressure reservoir.



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- Disconnect the plugs from the exhaust gas recirculation valve -N18- -1- and from the throttle valve control unit -J338- -3-.
- Open the clamp -4- and pull out the connecting hose.



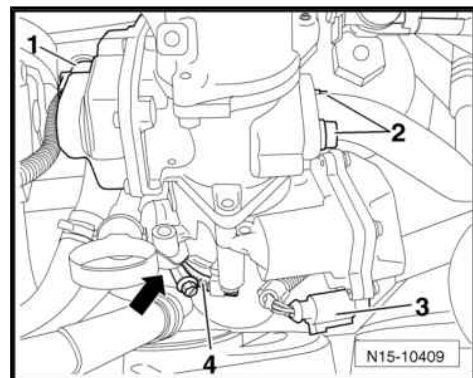
- Release the screws from the oil measuring connection -arrow- and from the connection pipe for the exhaust gas recirculation -2-.
- Release fixing screws for intake manifold crosswise from the outside to the inside using the socket wrench -T40159 - .
- Take out the intake manifold.

Install

Installation is performed in the reverse order, pay attention to the following points:

- Replace gaskets.
- Tighten the fixing screws of the intake manifold crosswise from the inside to the outside.

Tightening torque: ➔ [page 192](#)



3.3 Air filter - Summary of components

Removing and installing air filter ➔ [page 196](#)

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1 - Suction hose

- ☐ to exhaust gas turbo-charger

2 - Pipe support for ventilation

- ☐ with heating
- ☐ only vehicles for cold climatic zones

3 - Connecting pipe

- ☐ for crankcase, bleed
- ☐ to remove, press release buttons

4 - 2 Nm

5 - Air mass meter -G70-

- ☐ O-ring
- ☐ replace if damaged

7 - 2 Nm

- ☐ Screws for the support of the air filter top part

8 - 8 Nm

- ☐ Screw for the support of the air filter (air filter bottom part)

9 - Bushing

10 - Base

11 - Air filter top part

12 - Air filter element

- ☐ pay attention to change intervals ⇒ Maintenance ; Octavia II

13 - Air filter bottom part

14 - Connecting piece

- ☐ for drain pipe

15 - Overflow valve

16 - Hose

- ☐ for water drainage

17 - Connecting hose

18 - Inlet connection

- ☐ screwed onto lock carrier
- ☐ with pinhole on engines BS-4 ("monsoon hole")

19 - 2 Nm

20 - Intake air duct

21 - Cover

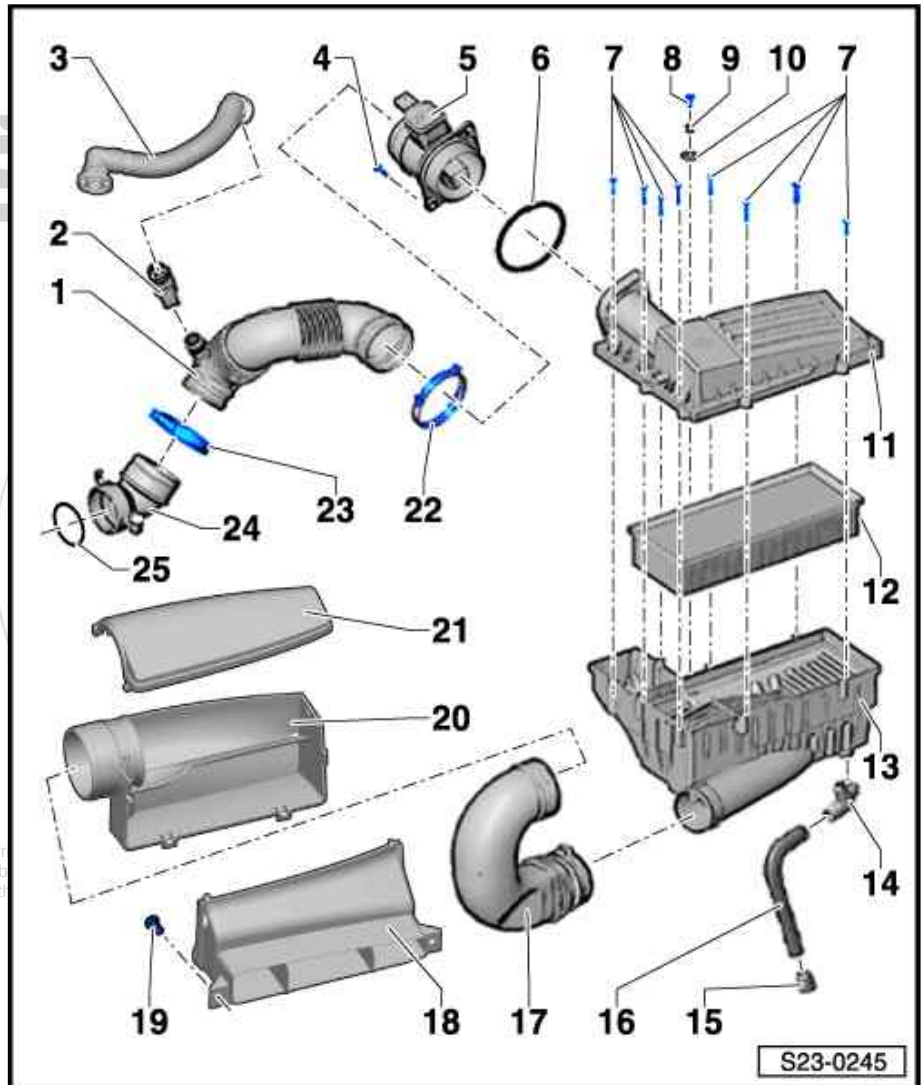
- ☐ Intake air duct

22 - Spring strap clamp

23 - Spring strap clamp

24 - Inlet connection

- ☐ Observe fitting position to exhaust gas turbocharger





- ❑ with fixing screw, 9 Nm

25 - O-ring

- ❑ replace

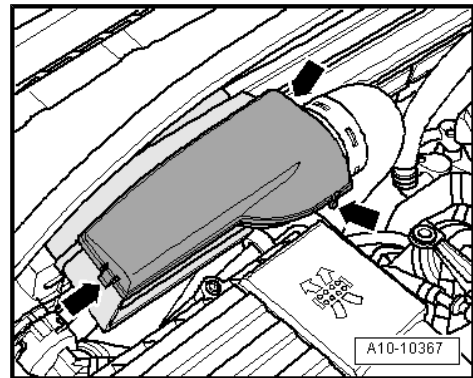
3.4 Removing and installing air filter housing

Special tools and workshop equipment required

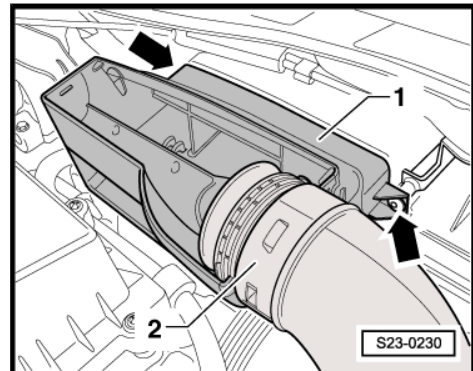
- ◆ Pliers for spring strap clamps

Removing

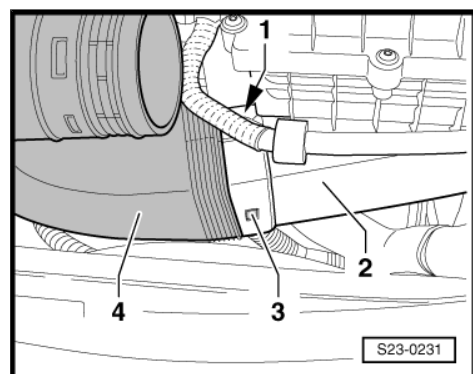
- Remove engine cover ➔ [page 17](#) .
- Remove cover for air intake connection, to do so release lateral retaining clasps -arrows-.



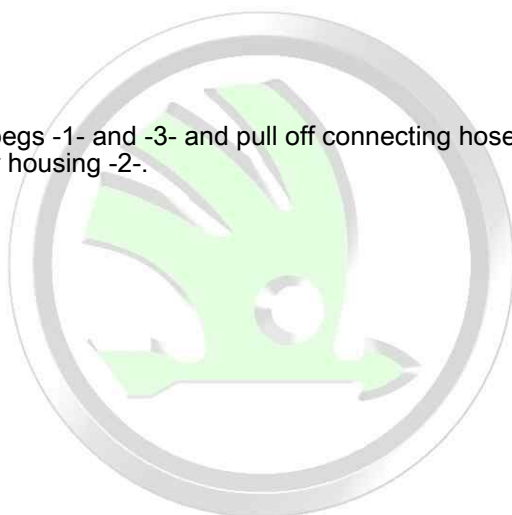
- Release screws -arrows- for the air intake connection -1- and take connecting hose -2- out of the guide.



- Press in catch pegs -1- and -3- and pull off connecting hose -4- from air filter housing -2-.



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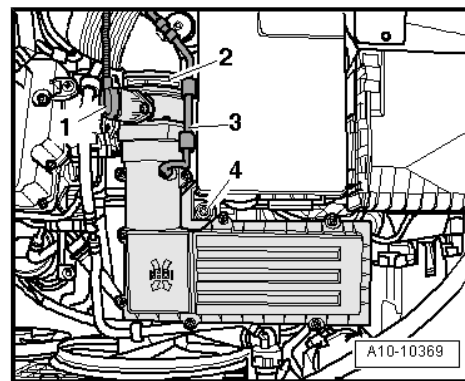
- Unplug connector -1- from air mass meter -G70- .
- Detach vacuum hose -3- and suction hose -2-.
- Slacken screw -4- and remove air filter housing.

Remove suction hose

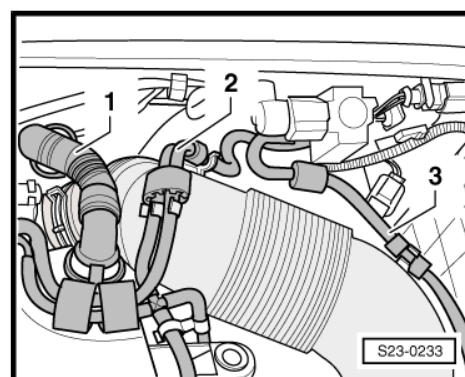


Note

Due to the poor access of the pliers for spring strap clips to the bottom suction hose it is preferable to remove the connection fitting from the exhaust turbocharger.



- Unclip hoses -2- and -3- from suction hose.
- Remove the connection pipe -1-.

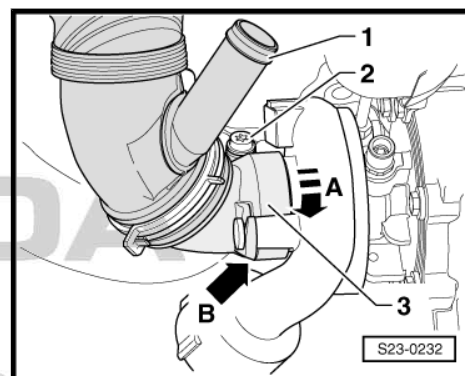


- Release screw -2-.
- Swivel connection fitting -3- in the -direction of the arrow A- and remove with the suction hose -1-.

Install

Installation is performed in the reverse order, pay attention to the following points:

- When attaching the connection fitting -3- at the exhaust gas turbocharger make sure that the connection fitting is correctly seated on the bolt of the exhaust gas turbocharger -arrow B-.





4 Engine control unit

4.1 Removing and installing engine control unit



Note

If the engine control unit should be replaced, connect vehicle diagnosis, measurement and information system -VAS 5051- and in the guided fault detection system carry out "replace engine control unit".

Special tools and workshop equipment required

- ♦ Body saw e.g. -V.A.G 1523 A-

Removing

- Switch off ignition.
- Remove the cooling water tank cover ⇒ Body Work; Rep. Gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Removing windscreen wiper and washer system ⇒ Electrical System; Rep. Gr. 92 .

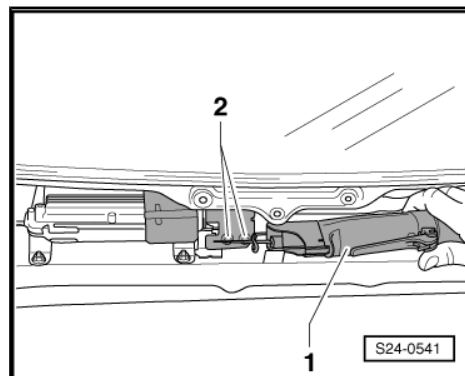
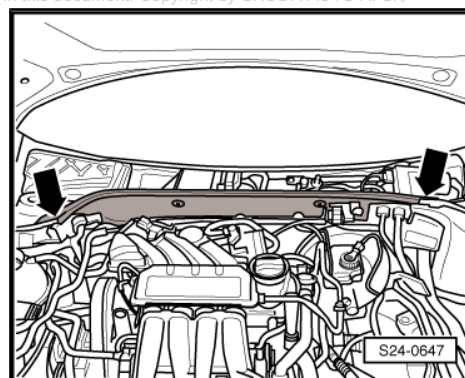
For vehicles with protective cover

- Cut with body saw -1- a slot for the cross-head screwdriver in the heads of the pull-off screws -2-.



Note

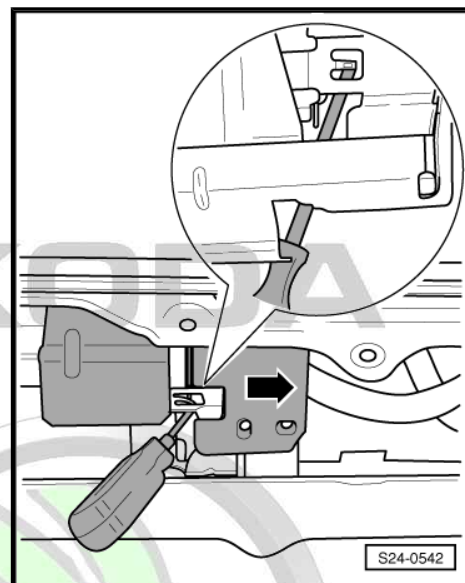
- ♦ *It must be sawed twice with the body saw, so that the slot is wide enough, in order to be able to unscrew the screws with a suitable screwdriver.*
- ♦ *The pull-off screws until are inserted with locking agent.*
- Release screws -2-.



- Lift locking tab of protective cover with cross-head screwdriver.
- Push the protective cover in the -direction of the arrow- out of the bracket for engine control unit.

Continued for all vehicles

- Disconnect front plug -1- and remove from engine control unit.



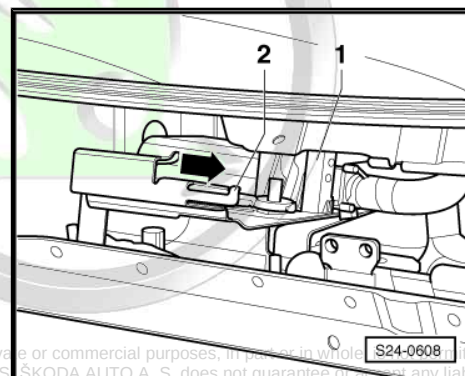
- Lever off retaining bracket -2- slightly.
- Push engine control unit out of the bracket -arrow-.
- Disconnect rear plug and remove from engine control unit.

Install



Note

For vehicles with protective cover, the metal swarfs must be suctioned out of the plenum chamber before installing the engine control unit.



- Connect rear plug to engine control unit and lock.
- Push engine control unit into the bracket and lock the retaining bracket -2-.
- Connect front plug to engine control unit and lock.

For vehicles with protective cover

- Fasten protective cover with new pull-off screws (before tightening align the protective cover in such a way that it does not come into contact with the surrounding components)

Continued for all vehicles

- Installing windscreen wiper and washer system ⇒ Electrical System; Rep. Gr. 92 .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work; Rep. Gr. 66 .



26 – Exhaust System

1 Removing and installing parts of the exhaust system



Note

- ♦ *The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.*
- ♦ *Replace the gaskets and the self-locking nuts.*
- ♦ *When performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary slacken the double clamp and align the exhaust system so as to create adequate clearance between these components and the vehicle body, and that the weight of the exhaust system is evenly distributed over the hangers.*

1.1 Pre-exhaust pipe with diesel particle filter - Summary of components

The exhaust turbocharger and the exhaust manifold are one component part; remove and install ➔ [page 158](#) .

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1 - 8 Nm

2 - Exhaust gas pressure sensor 1 -G450-



Caution

***Risk of damage!**
The exhaust gas pressure sensor 1 -G450- is very sensitive and must only be removed and replaced complete with bracket and hoses.*

! must not touch somewhere when laying it down with the bracket.

3 - 9 Nm

4 - Heat shield

5 - Lambda probe -G39- , 50 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ for re-used lambda probe, only coat the thread with hot bolt paste -G 052 112 A3- ; the hot bolt paste -G 052 112 A3- must not get into the slots of the probe body

6 - Exhaust gas temperature sender 4 -G648- , 45 Nm

- ☐ the thread of new temperature senders must be coated with assembly paste
- ☐ grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.

7 - Gasket

- ☐ replace
- ☐ Check fitting position

8 - Clamp - 7 Nm

- ☐ replace

9 - Exhaust gas temperature sender 3 -G495- (Temperature sender downstream particle filter -G527-)

- ☐ 45 Nm
- ☐ the thread of new temperature senders must be coated with assembly paste
- ☐ grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.

10 - 25 Nm

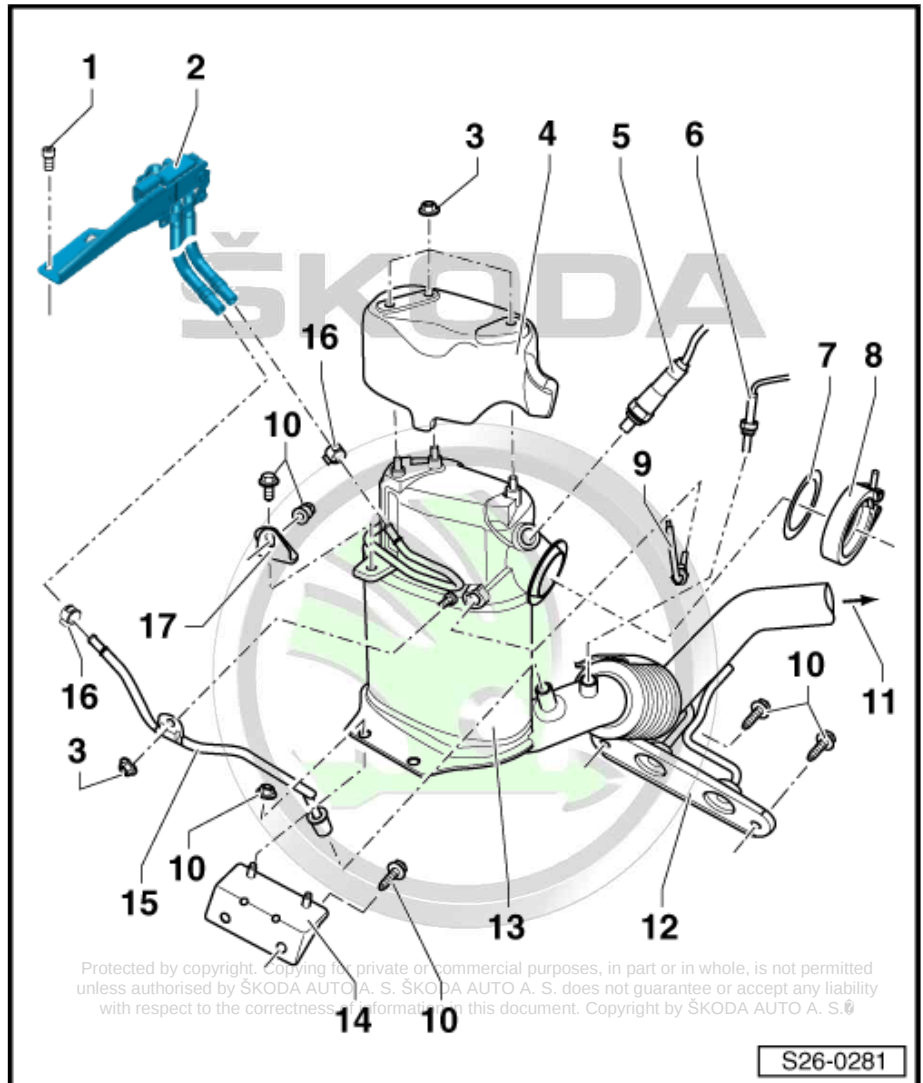
11 - to middle part of exhaust system

12 - Hanger

- ☐ replace if damaged

13 - Diesel particle filter

- ☐ with oxidation catalytic converter and pre-exhaust pipe
- ☐ after replacing, the adaptation of the ash mass balance must be set to "0" ⇒ Vehicle diagnosis, testing and information system VAS 5051



- ☐ removing and installing ⇒ [page 203](#)

14 - Support

- ☐ bolted to the cylinder block

15 - Control line, 45 Nm

16 - Clamp

- ☐ replace

1.2 Middle or rear part of the exhaust system - Summary of components

1 - from pre-exhaust pipe

2 - Double clamp

- ☐ align exhaust system free of stress before tightening ⇒ [page 207](#)
- ☐ Tighten screwed connections uniformly

3 - Middle part of exhaust system

- ☐ for first equipment building unit with rear part of exhaust gas system, replace individually when carrying out repairs
- ☐ replace ⇒ [page 206](#)
- ☐ Align exhaust system free of stress ⇒ [page 207](#)

4 - Retaining strap

- ☐ replace if damaged
- ☐ Pay attention to the part number

5 - Rear tunnel bridge

6 - 23 Nm

7 - Rear part of exhaust system

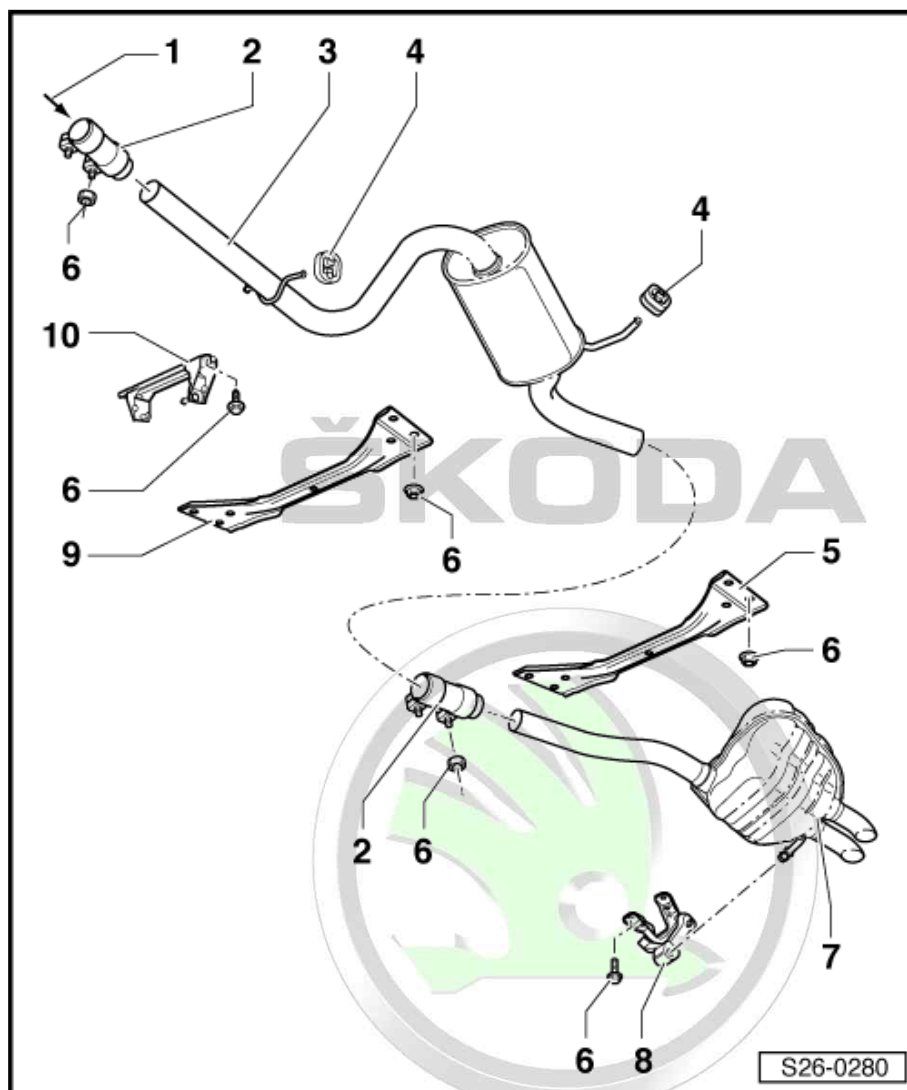
- ☐ for first equipment building unit with middle part of exhaust gas system, replace individually when carrying out repairs
- ☐ replace ⇒ [page 206](#)
- ☐ Align exhaust system free of stress ⇒ [page 207](#)

8 - Hanger

- ☐ replace if damaged

9 - Front tunnel bridge

10 - Hanger



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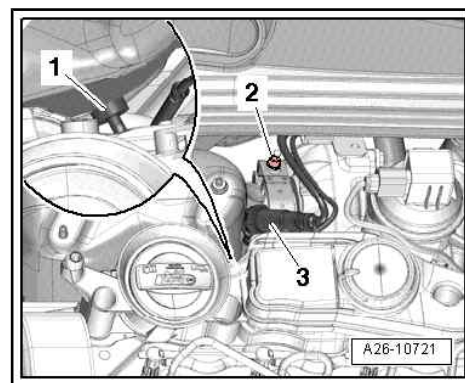
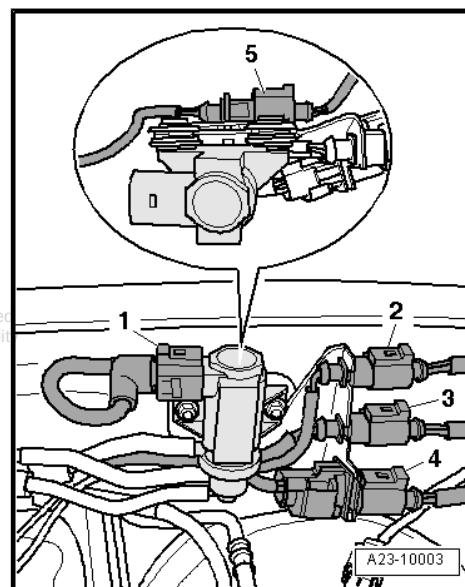
1.3 Removing and installing pre-exhaust pipe with diesel particle filter

Special tools and workshop equipment required

- ◆ Lifting device -MP 9-201 (2024A)-
- ◆ Ratchet ring wrench -T10384-
- ◆ Ring spanner set for lambda probe
- ◆ Set of tools SW 17 -T10395-
- ◆ Hot screw paste -G 052 112 A3-
- ◆ Gearbox attachment device -T10404-
- ◆ Screw M10x30

Removing

- Remove engine cover ⇒ [page 17](#) .
- Disconnect the following plug connections and expose the cables.
- ◆ Position 2: exhaust gas temperature sender 4 -G648-
- ◆ Position 4: lambda probe -G39-
- Disconnect the plug connection at the exhaust gas temperature sender 3 -G495- (temperature sender downstream particle filter -G527-) -1- (fastened behind the bracket).
- Pull the plug out of the bracket and unclip the guide on the partition wall -2- and on the exhaust gas turbocharger.
- Slacken screw -2- and remove clamp.
- Remove lambda probe -G39- -3-.





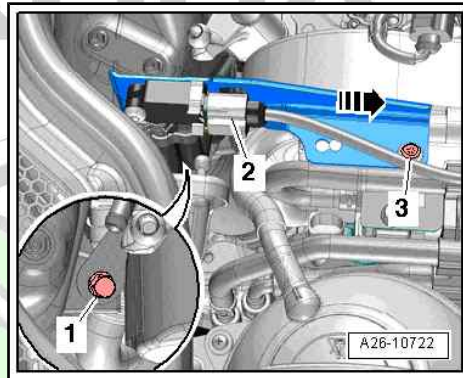
- Disconnect plug -2- at exhaust gas pressure sensor 1 -G450- .
- Unscrew screws -1- (bracket on cylinder head) and remove -3- the bracket with the exhaust gas pressure sensor 1 -G450- from the bracket of the additional fuel pump in -direction of arrow-.
- Place the bracket with the exhaust gas pressure sensor 1 -G450- to the rear.



Caution

Risk of damage!

- ◆ *The exhaust gas pressure sensor 1 -G450- is very sensitive and must not touch somewhere when laying it down with the bracket.*



- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .

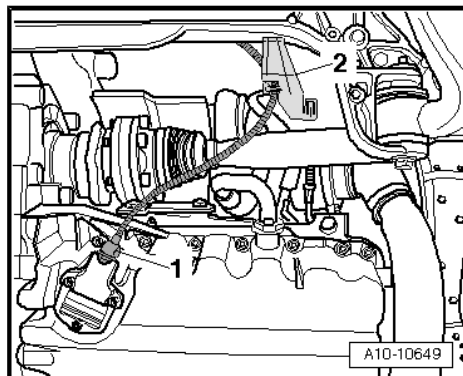
Vehicles fitted with auxiliary heating

- Remove long exhaust pipe of auxiliary heating ⇒ Heating, Air Conditioning; Rep. Gr. 82 .

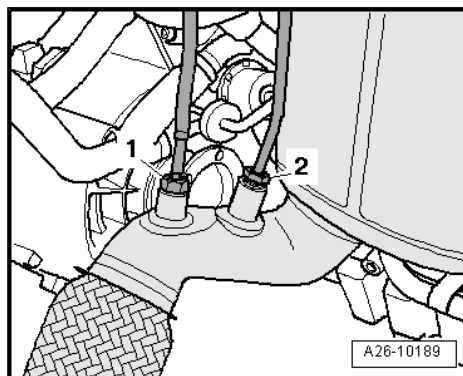
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Continued for all vehicles

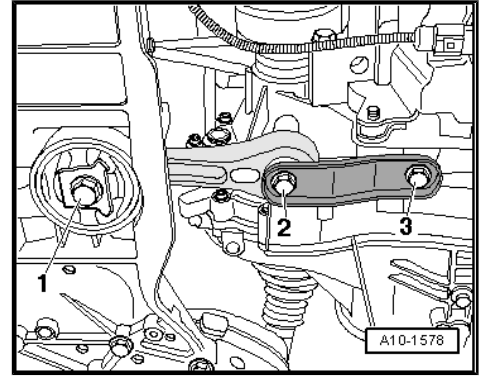
- Unbolt heat shield for right drive shaft.
- Remove drive shaft to the right ⇒ Chassis; Rep. Gr. 40 .
- Disconnect plug -1- at the oil level and oil temperature sender -G266- .
- Remove bracket -2- for the wiring harness of the oil level and oil temperature sender -G266- from the assembly carrier.



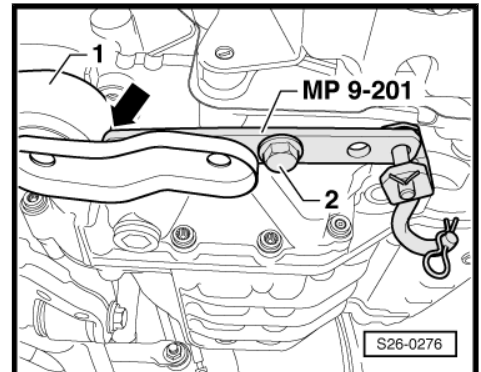
- Unscrew the exhaust gas temperature sender 4 -G648- -1- from the exhaust pipe.
- Slacken the double clamp and slide it backwards.



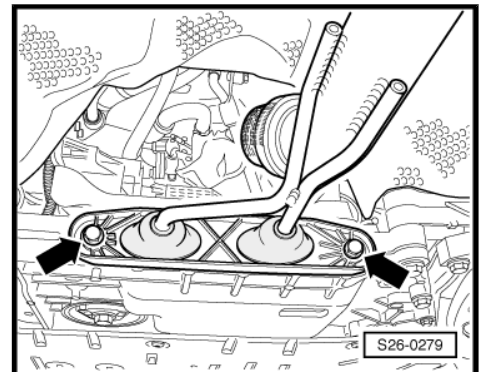
- Screw out screws -2- and -3- of the pendulum support.



- Push the engine forwards approx. 35 mm and support it with the hanger from -MP 9-201- and the screw -2- (M10x30) at the pendulum support -1- -arrow-.



- Unbolt bracket for exhaust system -arrows-.



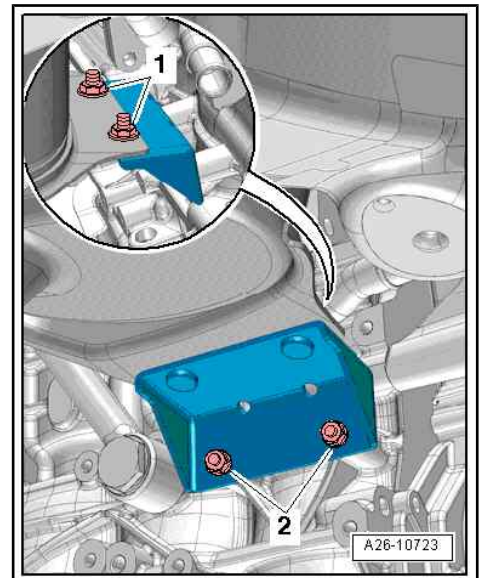
- Unscrew nuts -1- using the ratchet ring wrench -T10384- .
- Release screws -2- and remove holder for diesel particle filter.
- Push the diesel particle filter towards the rear and separate the hose connections from the exhaust gas pressure sensor 1 -G450- at the pipes of the diesel particle filter.
- Remove exhaust gas pressure sensor 1 -G450- with bracket and hoses and carefully place down.

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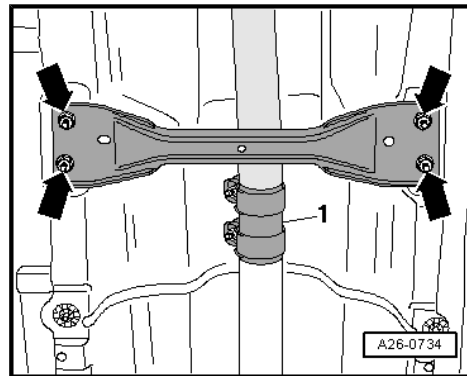
Note

- ◆ The assistance of a 2nd mechanic is required for guiding out the diesel particle filter.
- ◆ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
- ◆ Do not bend the decoupling element by pulling it and do not damage the wire mesh.
- ◆ Secure the decoupling element against being over-tensioned by means of the transport security -T10404- .





- Unscrew the front cross member -arrows-.

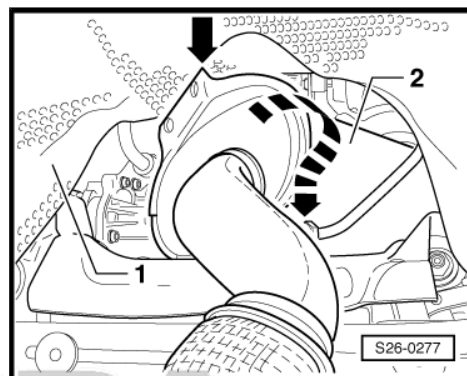


- Turn the diesel particle filter -1- by 180° -direction of arrow- and swivel out.



Note

If the bracket of the diesel particle filter should obstruct when swivelling out -arrow-, slightly push aside the heat shield -2- if necessary.



Install



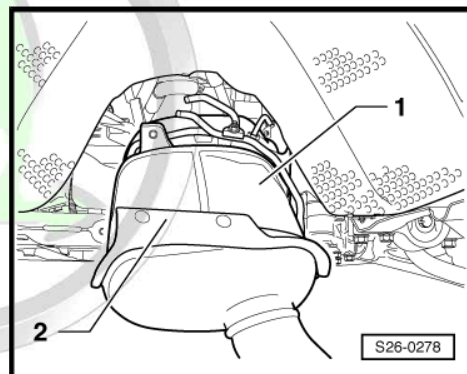
Note

- ♦ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
- ♦ Do not expose the decoupling element to tension, do not damage the protective wire mesh.
- ♦ Secure the decoupling element with the transport device - T10404- against overtensioning.

- Insert the diesel particle filter -1- with the bracket -2- upwards as shown and swivel to the left by 180°.

Further installation occurs in reverse order. Pay attention to the following:

- ♦ Replace gasket and clamp for diesel particle filter.
- ♦ Tightening torques ⇒ [page 200](#).
- First fasten the diesel particle filter loosely to the exhaust gas turbocharger and then fasten to the bottom bracket.
- Align exhaust system free of stress ⇒ [page 207](#).



After replacing the diesel particle filter, the adaptation of the ash mass balance must be set to "0" ⇒ [Vehicle diagnosis, testing and information system VAS 5051](#).

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1.4 Replacing middle or rear part of the exhaust system

Special tools and workshop equipment required

- ♦ Body saw , e.g. -V.A.G 1523 A- or chain pipe cutter , e.g. -VAS 6254-
- ♦ Protective goggles

Work procedure



Note

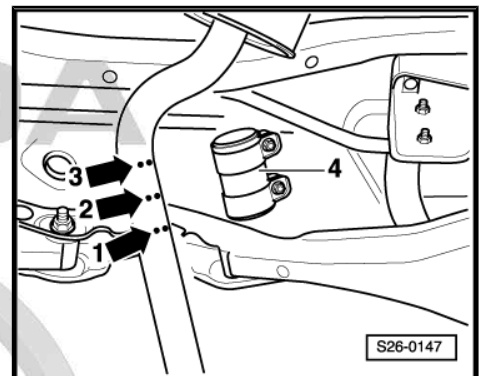
- ◆ For individually replacing the middle or rear part of the exhaust system, a separation point is provided in the connecting pipe.
- ◆ The separation point is marked by indentations on the circumference of the exhaust pipe.



WARNING

In order to avoid injuries because of metal swarfs, wear safety goggles and safety clothing.

- Separate exhaust pipe at right angles at the separation point -arrow 2-.
- When installing, position double clamp -4- at the side markings -arrow 1- and -arrow 3-.
- Rotate the double clamp -4- in such a way that the ends of the screws are as far upwards as possible.
- Align rear part of exhaust system horizontally and tighten double clamp to 25 Nm.
- Align exhaust system free of stress ⇒ [page 207](#).

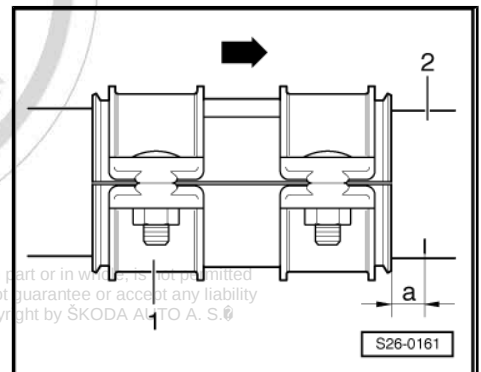


1.5 Aligning exhaust system free of stress

- The exhaust gas system must be cold for aligning.
- Slacken front double clamp -1- and align to pre-exhaust pipe -2- (-arrow- points in direction of travel).
- a- = 5 mm

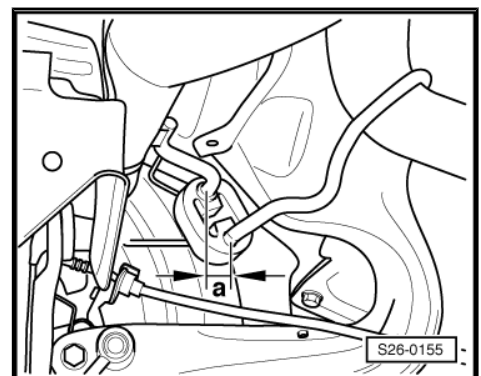
The fixing screws must be on the right. They must not protrude beyond the bottom edge of the double clamp.

- Tighten front screw by hand.



- Push the exhaust system so far forward until the initial load -dimension a- on the retaining strap at the middle part of the exhaust system is 9...11 mm.
- Tighten the nuts of the front double clamp evenly to 23 Nm.

Align exhaust tailpipes

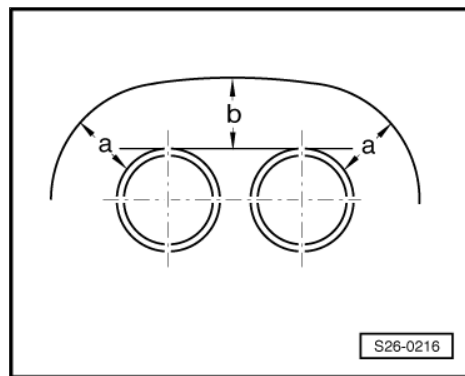




- Align rear part of exhaust system in such a way that there is an equal distance -a- on the left and right between bumper opening and tailpipes.

At the same time there must be an equal distance -b- from the bumper opening to the tailpipes.

For aligning, if necessary the hangers of the exhaust system must be loosened.



1.6 Inspecting the exhaust system for leak-tightness

- Start engine and run in idle.
- Seal off exhaust tailpipes for the duration of the leak check (e.g. with cloth or plug).
- Inspect connection points of cylinder head/exhaust manifold, exhaust gas turbocharger/pre-exhaust pipe etc. for leaktightness by listening and visual inspection.
- Eliminate any leak found.

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2 Exhaust gas recirculation system



Note

- ◆ The exhaust gas recirculation system is operated by the engine control unit -J248- for EGR valve -N18-.
- ◆ The EGR valve -N18- consists of the mechanical valve, the EGR control motor -V338- and the EGR potentiometer -G212-.
- ◆ The electrically operated valve with cone-shaped valve plunger makes it possible to achieve different opening cross-sections at different valve strokes.
- ◆ Always replace self-locking nuts.

2.1 Connection diagram for vacuum hoses

Connection diagram for vacuum hoses ⇒ [page 163](#).

2.2 Exhaust gas recirculation with radiator for exhaust gas recirculation - Summary of components

1 - Vacuum line

- ☐ do not change bending form

2 - Heat shield collar

- ☐ replace if damaged

3 - 9 Nm

4 - Radiator for exhaust gas recirculation

- ☐ with change-over flap
- ☐ Check change-over for radiator for exhaust gas recirculation
⇒ [page 212](#)
- ☐ removing and installing
⇒ [page 211](#)

5 - Gasket

- ☐ replace

6 - 22 Nm

7 - Pipe for exhaust gas recirculation

8 - 9 Nm

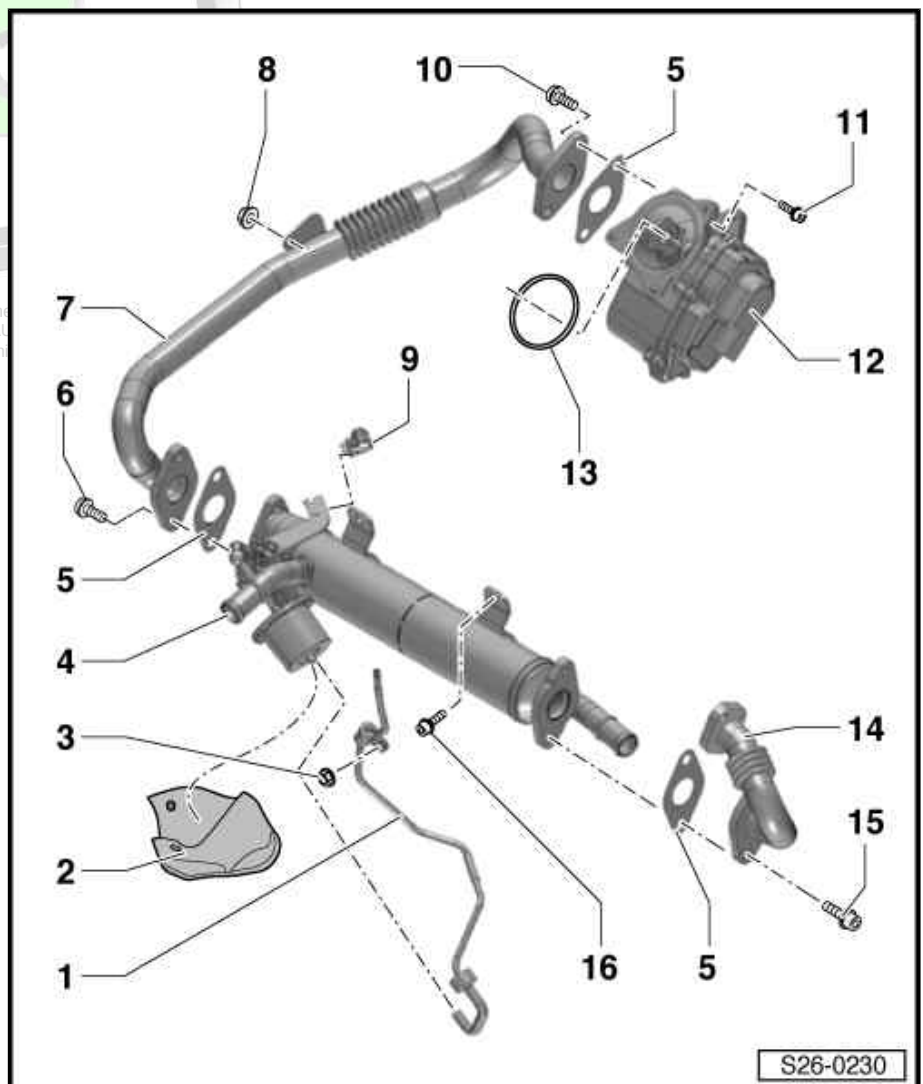
9 - Clip

10 - 22 Nm

11 - 9 Nm

12 - Exhaust gas return valve - N18-

- ☐ consists of:
 - ◆ mechanical valve (electrically operated)



- ◆ EGR control motor -V338-
- ◆ EGR potentiometer -G212-
 - removing and installing ⇒ [page 210](#)

13 - Sealing ring

- replace

14 - Connecting pipe

15 - 20 Nm

16 - 10 Nm

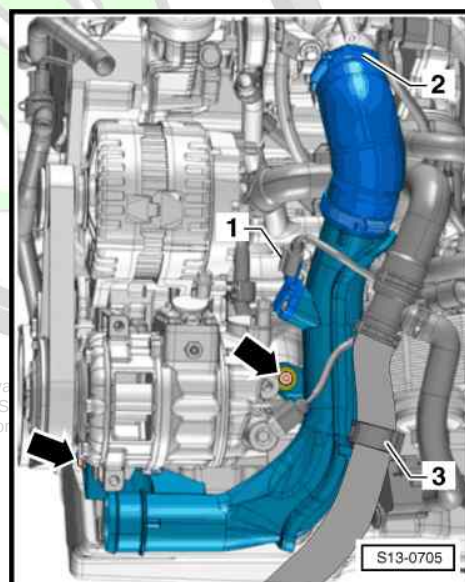
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2.3 Removing and installing the exhaust gas recirculation valve -N18-

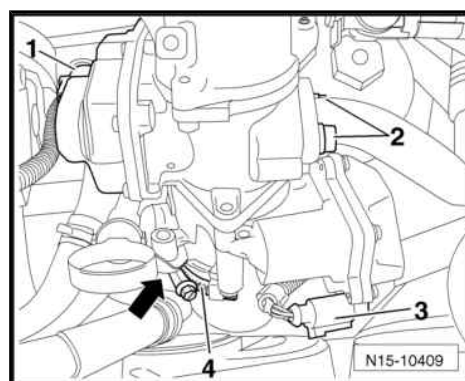
Removing

- Remove fan shroud with radiator ⇒ [page 132](#) .
- Release screws -arrows-.
- Expose coolant hose -3-.
- Loosen hose clamp -2-.
- Disconnect plug -1- at the charge pressure sender -G31- and remove the right charge air pipe.

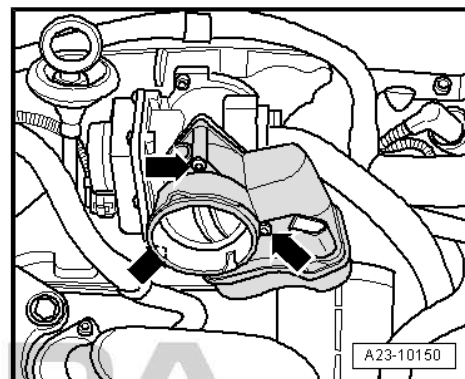
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- Disconnect the plug -3- from the throttle valve control unit -J338 - .



- Release screws -arrows- and remove throttle valve control unit -J338- .

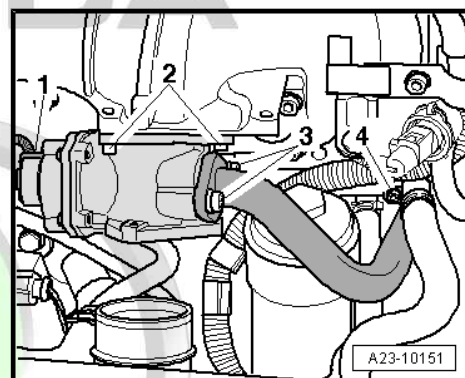


- Disconnect plug -1- on the exhaust gas recirculation valve - N18- .
- Release screws -2- and -3-, remove exhaust gas recirculation valve -N18- .

Install

Installation is performed in the reverse order, pay attention to the following points:

- ◆ Always replace gasket rings and seals.
- ◆ Tightening torques: ⇒ [page 209](#) and ⇒ [page 167](#)



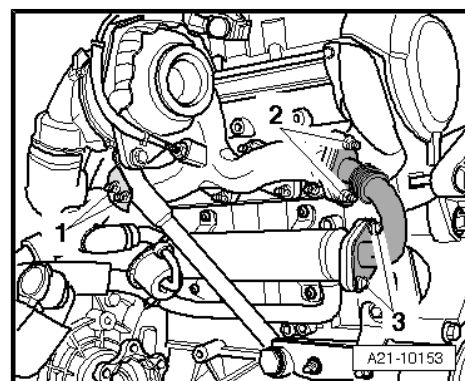
2.4 Removing and installing radiator for exhaust gas recirculation

Special tools and workshop equipment required

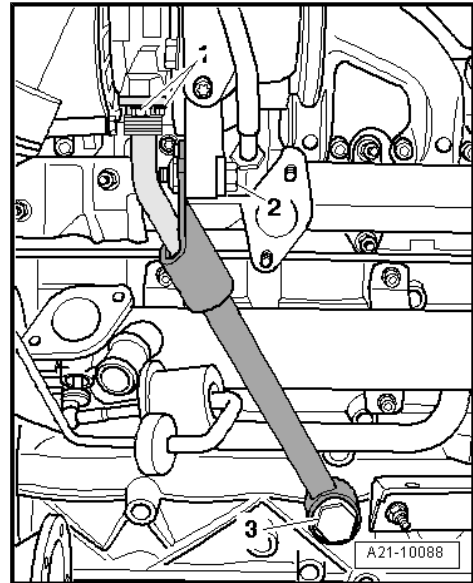
- ◆ Hose clamps up to Ø 25 mm -MP7-602 (3094) -
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps

Removing

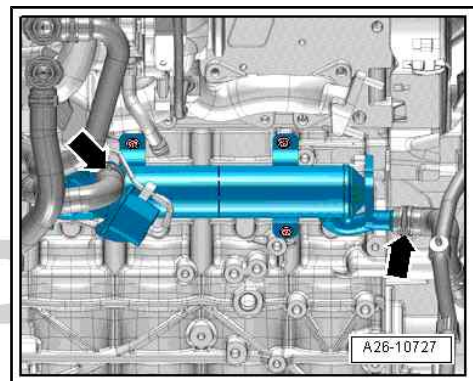
- Remove air filter housing with air mass meter -G70- ⇒ [page 196](#) .
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27 .
- Remove diesel particle filter ⇒ [page 203](#) .
- Release nuts -2- and screws -3- and remove the connection pipe for exhaust gas recirculation.



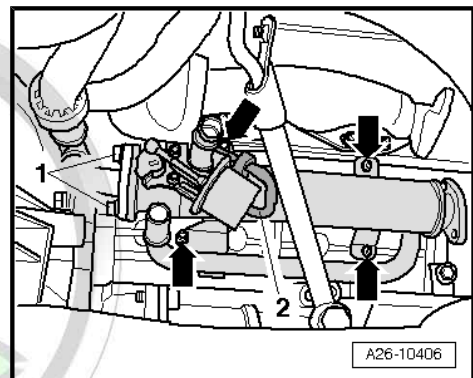
- Release nuts -1-, screw -2- and hollow screw -3-.
- Remove support for exhaust turbocharger with oil return line.
- Place a catch pan under the engine.



- Pinch off the coolant hoses with the hose clamps -MP7-602- and remove from the radiator for exhaust gas recirculation, to do so slacken the hose clamps -arrows-.
- Remove heat shield collar from vacuum setting element.



- Release screws -1- for connection pipe for exhaust gas recirculation.
- Remove vacuum hose -2- from vacuum setting element and expose.
- Release screws -arrows- and remove radiator for exhaust gas recirculation.



Install

Installation is performed in the reverse order, pay attention to the following points:

- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.
- ◆ Secure all hose connections with corresponding hose clips.
- ◆ Tightening torques ⇒ [page 209](#) and ⇒ [page 157](#) .
- Inspect coolant level and top up if necessary ⇒ [page 111](#) .

2.5 Check change-over for radiator for exhaust gas recirculation

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-

Work procedure



Note

The vacuum setting element for change-over flap is accessible from below.

- Remove the sound dampening system ⇒ Body Work; Rep. Gr. 50 .
- Unbolt heat shield for right drive shaft.
- Detach vacuum hose from vacuum setting element.
- Connect hand vacuum pump to the vacuum setting element.
- Actuate the hand vacuum pump in order to generate negative pressure.
- The vacuum setting element must open the change-over flap up to the stop at maximum 0.08 MPa (0.8 bar) negative pressure and in case of ventilation close it up to the stop -arrows-.

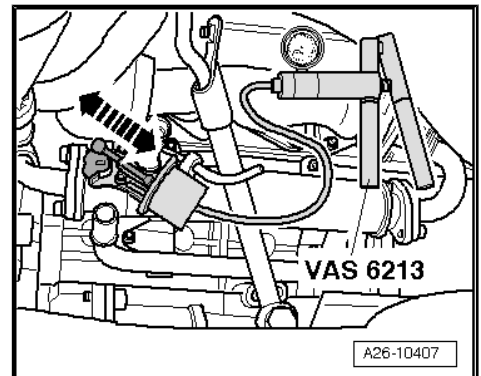


Note

- ◆ *For this test the opening of the change-over flap can be performed in jolts. In driving mode the change-over flap opens suddenly due to the large negative pressure volume.*
- ◆ *The closing of the change-over flap must be carried out suddenly when ventilating (e.g. detach vacuum hose).*

If the vacuum setting element does not open or close the change-over flap up to the stop:

- Replace radiator for exhaust gas recirculation with vacuum setting element ⇒ [page 211](#) .



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28 – Glow Plug System

1 Glow Plug System

1.1 Removing and installing glow plugs



Note

Metal pencil type glow plugs are installed in this engine.

Special tools and workshop equipment required

- ◆ Flexible-head wrench SW 10 , e.g. -3220 -
- ◆ Cleaning agent and grease remover e.g. -D 000 401 04-
- ◆ Protective goggles and gloves

Removing

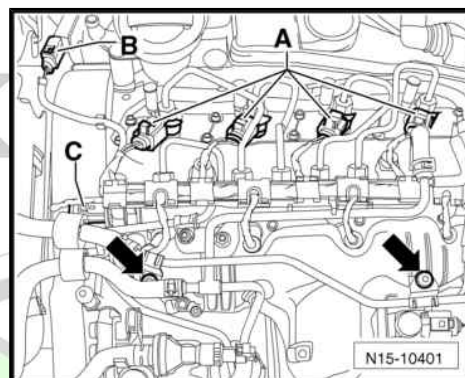
Observe all safety measures and notes for assembly work on the fuel and injection system as well as the rules for cleanliness
⇒ [page 2](#) .

- Switch off ignition.
- Remove engine cover ⇒ [page 17](#) .
- Take out the noise insulation at the injection units.
- Disconnect the plugs at the injection units -A-, the exhaust gas pressure sensor 1 -G450- -B- and the fuel pressure sender -G247- -C-.
- Release the fixing screws -arrows- of the coolant line from the intake manifold and lay the line in front of the intake manifold.
- Unclip the wiring loom from the wiring guide of the pencil type glow plugs.

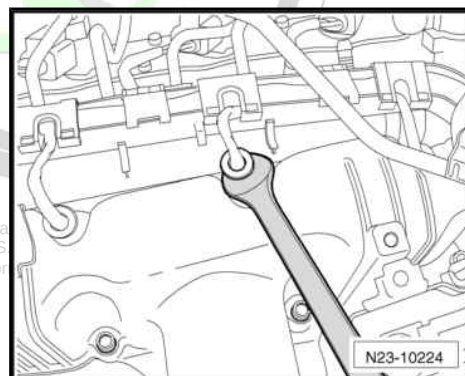


Caution

- ◆ *Carefully disconnect the plug from the pencil type glow plugs.*
- ◆ *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*



- Carefully remove the plugs from the pencil type glow plugs. During this process, support using an open-end wrench SW 11.
- Unscrew the fixing screw of the fuel return-flow line on the intake manifold.



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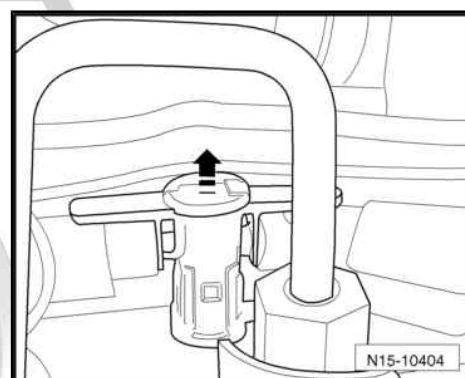
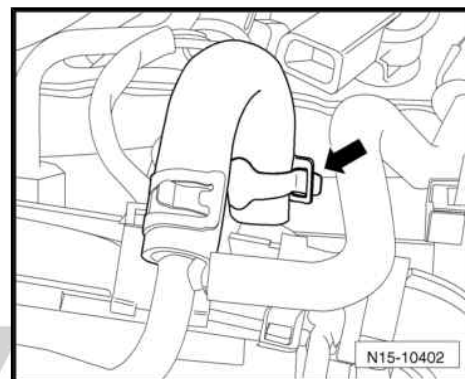
- Slacken the spring strap clamp -arrow- and detach the cable on the high pressure reservoir (rail).



WARNING

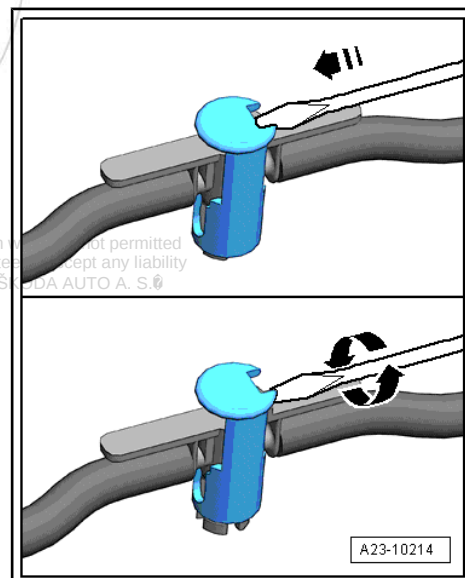
Wear protective gloves and protective goggles when working with grease remover!

- Before removing, clean the return line connections at the injection units with a grease remover.
- Disconnect the connections of the fuel return-flow line at the injection units. To unlock, pull upwards -arrow-.



Note

- ◆ *Pay attention to cleanliness, no dirt must get into the removed return lines and the connections of the injection units.*
- ◆ *If the return line connection cannot be pulled upwards, open the connection by turning it with a narrow screwdriver.*
- Slacken the spring strap clamp and detach the fuel return-flow line from the fuel filter.





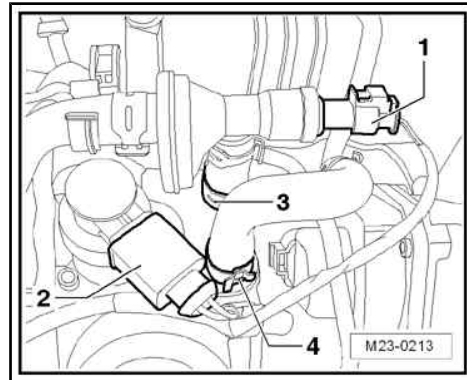
- Slacken the spring strap clamp -4- and detach the fuel return-flow line at the fuel-high pressure pump.
- Seal the lines so that no dirt can get into the fuel system.
- Remove fuel return-flow lines and lay them in front of the intake manifold.
- Remove the cable guide and place it to the side.
- Clean the pencil type glow plug channel in the cylinder head. No dirt must get into the cylinder.

When cleaning, for example:



WARNING

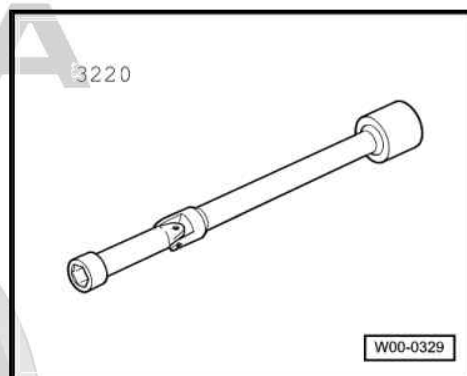
Wear protective gloves and protective goggles when working with grease remover!



1. Suction off heavy dirt using a vacuum cleaner.
 2. Spray the pencil type glow plug channel using a brake cleaner or a suitable cleaner, let it take effect for a short period of time and blow out with compressed air.
 3. Then clean the pencil type glow plug channel with a cloth which is wetted with oil.
- To slacken the pencil type glow plugs, use the hinged wrench SW 10 -3220- .

Install

- To tighten the pencil type glow plugs, use the hinged wrench SW 10 -3220- .
- Tighten the glow plugs.
- ◆ Tightening torque: 17 Nm
- Fit the plug again onto the relevant glow plug and check for firm seating.
- Interrogating and erasing fault memory of engine control unit
⇒ Vehicle diagnosis, testing and information system VAS 5051.



Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

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